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SEVENTH BIENNIAL REPORT

— OF THE —

# State Engineer

— AND OF THE —

Carey Land Act Board



— OF THE —

STATE OF MONTANA

1915-1916

A. W. MAHON  
STATE ENGINEER

INDEPENDENT PUBLISHING CO.  
HELENA, MONTANA



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# Seventh Biennial Report of the State Engineer

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Helena, Montana, November 30, 1916.

To His Excellency,  
Hon. Samuel V. Stewart,  
Governor of Montana.

Sir:

I have the honor to submit herewith, the Seventh Biennial Report of the State Engineer, embodying a brief analysis of the work of this office and such recommendations as to me seem advisable. There is included a summary of the water records of all streams measured in the state during the years 1914 and 1915, together with the precipitation records for the same years.

Because of the limited funds available during the past two years the work accomplished has been correspondingly limited, and no extensive new enterprises were undertaken.

The report of the Carey Land Act Board, of which the State Engineer is ex-officio secretary, is also included as its interests are closely interwoven with the duties of this office.

## Precipitation.

A summary of the annual precipitation for all stations of the U. S. Weather Bureau in Montana for the years 1914 and 1915 is included in the Water Resource section of this report, corresponding to the like period of stream measurements, and supplementing the summaries of all previous records given in the Fifth and Sixth Biennial Reports.

## Stream Measurements.

In supervising the expenditure of state funds for the measurement and record of the flow of streams in the state, I have continued to cooperate with Mr. W. A. Lamb, District Engineer of the Water Resources Branch of the U. S. Geological Survey, thus avoiding duplication of work and securing maximum results for the least possible expense.

In this work, Mr. C. S. Heidel, Hydrographer of the State Engineer's Office, has been in active charge of the field work, under the direction of this office, and most satisfactory results have been obtained and most cordial relations have at all times existed between the Federal and State service.

A summary of the measurements made is given in the Water Resource Section for the years 1914 and 1915, supplementing the reports

of all previous measurements, which were published in the Fifth and Sixth Biennial Reports.

### Well Data.

This office has frequently been requested to furnish data upon the availability of well water in various portions of the State, and in some instances the request was accompanied with a statement that they were either prospective settlers or purchasers who were not content with the statement of local people, but desired information from an authoritative source.

I was also requested by the United States Geological Survey, through the Water Resources Branch, to give them assurance of state aid in their underground water investigations to hasten the completion of this work. This I was unable to do as no appropriation was available for this purpose, and the limited funds allotted for our water resource work were restricting our activities to the very minimum of possible accomplishment.

While impossible to give the Federal authorities financial assistance, I did take up the possibilities of a better campaign for accumulating an estimate of well water conditions throughout the state, and proposed to the chief of the Water Resources Branch of the U. S. Geological Survey that if they would furnish the franked envelopes for a general enquiry, we would do the work, and the information received become part of the records of this office but available for their use in investigation of underground waters of the state.

This resulted in the Federal Office furnishing us with 10,000 franked envelopes for sending out an equal number of enquiry blanks which they also furnished together with 10,000 franked return envelopes, which relieved the state of any additional expense for the work.

This office then promptly sent out the blanks to all road supervisors, school clerks, school trustees, commercial clubs, and others whom we thought might be in touch with these matters, with the result that we received 2,000 replies from all parts of the state. These we have compiled in the office by townships on a card index system.

This information while reported from nearly 1,000 townships is not to be considered complete by over twenty-five per cent of the total number of townships in the state. For the townships reported the list of wells is not complete, so that no tabulated information is published herein, but any one desiring information for any particular locality can obtain all that is available by applying to this office.

### Recommendations.

The measurement of streams is an important duty of any state that desires capital to develop its resources. These records are also of great importance in the adjudication of water rights.

The water right filings and adjudications are also important and necessary data in any case of proposed development.

More important than either of these is the data showing what

water is actually diverted from the stream for beneficial use; the number and actual amount of appropriations made from the streams; the land actually under ditch and the amount of water actually diverted upon it; the amount of land susceptible to irrigation along the stream; and such other details as each stream and valley will show by examination, as being pertinent to the water supply and its beneficial use.

I therefore reiterate my former statements urging the necessity of this work, and recommend that in addition to stream measurements and records of water filings made on streams in this state, that this office begin a system of hydrographic reconnoissance work upon the several streams of the state; that the work proceed in a systematic manner by drainage basins, so that we may eventually have an estimate of the land under actual irrigation, and land susceptible of irrigation, as well as of the water actually used and susceptible of beneficial use on all streams and tributaries within our boundaries. These records to be available to the public as fast as compiled.

For the purpose of general hydrographic work by this office as outlined above, for stream measurements, keeping up records of water filings, and for hydrographic reconnoissance, I recommend the appropriation of \$12,500 for the year 1917, and \$13,500 for the year 1918.

I also recommend and urge that due consideration be given the advisability of a change in our water rights laws to embody a system of records and regulations in harmony with the laws of our neighboring states.

Respectfully submitted,

A. W. MAHON,

State Engineer.

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## Water Resource Section of the State Engineer's Seventh Biennial Report

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### PRECIPITATION.

In the following tables on precipitation are given, for various stations in Montana, rainfall data obtained from reports of the U. S. Weather Bureau. The first table gives, so far as available, the name of the station, the county in which it is situated, its elevation, the precipitation for 1914 and 1915, the tributary basin, and the main drainage basin in which each station is located. Where only part of a year is recorded, a foot note indicates the amount for the months recorded.

In the second table the weather stations are listed according to drainage basins and tributary basins, enabling a person who desires rainfall data in any particular drainage area to tell at once the points for which records are available.

These tables are supplementary to the data published in the Fifth and Sixth Biennial Reports.

## SEVENTH BIENNIAL REPORT OF THE STATE ENGINEER

U. S. WEATHER REPORTS ON PRECIPITATION IN MONTANA FOR 1914-1915.

Station	County	Elevation Feet	Precipitation— Inches		Tributary Basin	Drainage Basin
			1914	1915		
Absarokee.....	Stillwater.....	4,000	a	22.02	Stillwater.....	Yellowstone.
Adel.....	Cascade.....	5,200	22.02	21.86	Smith.....	Missouri.
Agricultural College.....	Gallatin.....	4,900	16.46	26.00	Gallatin.....	Missouri.
Anaconda.....	Deer Lodge.....	5,330	13.44	14.81	Clark Fork.....	Clark Fork.
Augusta.....	Lewis and Clark.....	4,071	14.96	b	Sun.....	Missouri.
Babb.....	Teton.....	4,461	16.34	c	St. Mary.....	St. Mary.
Bald Butte.....	Lewis and Clark.....	6,500	23.87	27.92	Missouri.....	Missouri.
Belton.....	Flathead.....	5,500	32.02	d	Flathead.....	Clark Fork.
Bernice.....	Jefferson.....	5,500	f.....	e	Jefferson.....	Missouri.
Big Prairie.....	Powell.....	4,094	13.54	20.08	Yellowstone.....	Yellowstone.
Big Timber.....	Sweet Grass.....	3,115	11.83	18.52	Yellowstone.....	Yellowstone.
Billings.....	Yellowstone.....	4,260	9.98	h	Maras.....	Missouri.
Blackleaf.....	Teton.....	5,200	10.73	13.86	Jefferson.....	Missouri.
Boulder.....	Jefferson.....	6,080	13.22	j	Jefferson.....	Missouri.
Bowen.....	Beaverhead.....	2,677	k	12.66	Milk.....	Missouri.
Box Elder.....	Hill.....	3,664	8.79	15.14	Jefferson.....	Missouri.
Brenner.....	Beaverhead.....	3,800	10.17	m	Clark Fork.....	Yellowstone.
Brider.....	Carbon.....	4,366	14.38	n	Maras.....	Missouri.
Broadview.....	Yellowstone.....	4,050	13.98	19.18	Musselshell.....	Missouri.
Browning.....	Teton.....	5,716	10.33	16.73	Yellowstone.....	Yellowstone.
Bushy.....	Big Horn.....	3,670	12.35	22.61	Yellowstone.....	Yellowstone.
Busted.....	Stillwater.....	3,361	14.63	p	Clark Fork.....	Clark Fork.
Butte.....	Silver Bow.....	3,132	14.63	q	Madison.....	Missouri.
Butte.....	Madison.....	3,340	12.87	r	Missouri.....	Missouri.
Cameron.....	Canyon Ferry.....	3,502	15.92	s	Missouri.....	Missouri.
Canyon Ferry.....	Lewis and Clark.....	3,340	12.87	t	Maras.....	Missouri.
Cascade.....	Cascade.....	3,501	14.10	u	Milk.....	Missouri.
Chester.....	Hill.....	5,027	16.88	v	Missouri.....	Missouri.
Chinook.....	Blaine.....	3,340	16.88	w	Missouri.....	Missouri.
Clear Creek.....	Chouteau.....	5,027	12.87	x	Shields.....	Yellowstone.
Clear Lake.....	Park.....	3,170	19.57	y	Flathead.....	Clark Fork.
Clyde Park.....	Flathead.....	3,750	14.10	z	Bitterroot.....	Clark Fork.
Columbia Falls.....	Ravalli.....	3,501	16.41	a-1	Maras.....	Missouri.
Como.....	Conrad.....	5,680	16.41	b-1	Yellowstone.....	Yellowstone.
Conrad.....	Teton.....	3,041	12.07	c-1	Musselshell.....	Missouri.
Cooke.....	Park.....	3,927	8.07	d-1	Big Horn.....	Yellowstone.
Copper.....	Meagher.....	3,041	12.07	e-1	Missouri.....	Missouri.
Crow Agency.....	Big Horn.....	1,927	8.07	f-1	Maras.....	Missouri.
Culberson.....	Sheridan.....	3,745	12.70	g-1	Bitterroot.....	Clark Fork.
Cut Bank.....	Teton.....	2,925	10.76	h-1	Flathead.....	Clark Fork.
Darby.....	Ravalli.....	2,925	10.76	i-1	Judith.....	Missouri.
Dayton.....	Flathead.....	5,500	18.85	j-1	Jefferson.....	Missouri.
Denton.....	Verges.....	5,143	18.85	k-1	Jefferson.....	Missouri.
Dillon.....	Beaverhead.....	5,143	18.85	l-1	Jefferson.....	Missouri.

U. S. WEATHER REPORTS ON PRECIPITATION IN MONTANA FOR 1914-1915—Continued.

Station	County	Elevation Feet	Precipitation— Inches		Tributary Basin	Drainage Basin
			1914	1915		
Dunkirk.....	Toole.....	3,450	10.11	13.55	Marias.....	Missouri.
East Anaconda.....	Deer Lodge.....	5,500	13.14	15.93	Clark Fork.....	Clark Fork.
Ekulaka.....	Fallon.....	.....	10.58	c-1	Little Missouri.....	Little Missouri.
Fallon.....	Flathead.....	2,208	14.19	17.56	Yellowstone.....	Yellowstone.
Farmington.....	Fallon.....	.....	.....	d-1	Marias.....	Missouri.
London.....	Meagher.....	6,000	15.61	20.29	Musselshell.....	Missouri.
Flathead Creek.....	Gallatin.....	6,000	e-1	28.55	Yellowstone.....	Yellowstone.
Flathead.....	Fergus.....	.....	9.32	14.27	Musselshell.....	Missouri.
Forsyth.....	Rosebud.....	2,514	f-1	16.54	Yellowstone.....	Yellowstone.
Fort Shaw.....	Cascade.....	3,500	11.03	16.54	Sun.....	Missouri.
Fortine.....	Lincoln.....	2,975	19.33	20.65	Tobacco.....	Kootenai.
Foster.....	Big Horn.....	2,800	10.02	16.66	Yellowstone.....	Yellowstone.
Garnett.....	Fergus.....	5,500	29.60	5-1	Judith.....	Missouri.
Geyser.....	Fergus.....	4,147	h-1	15.17	Missouri.....	Missouri.
Glacier Park.....	Deer Lodge.....	4,786	18.10	1-1	Marias.....	Missouri.
Glasgow.....	Valley.....	2,092	j-1	16.73	Milk.....	Missouri.
Glendive.....	Dawson.....	2,091	12.39	17.32	Yellowstone.....	Yellowstone.
Glentana.....	Valley.....	.....	k-1	13.55	Missouri.....	Missouri.
Graham.....	Toole.....	3,500	10.03	10.57	Marias.....	Missouri.
Gold Butte.....	Custer.....	.....	13.38	21.68	Powder.....	Yellowstone.
Grass Range.....	Fergus.....	3,480	l-1	m-1	Musselshell.....	Missouri.
Great Falls.....	Cascade.....	3,350	17.70	21.03	Missouri.....	Missouri.
Hamilton.....	Ravalli.....	3,524	10.73	n-1	Bitterroot.....	Clark Fork.
Harlowton.....	Meagher.....	4,160	12.63	0-1	Musselshell.....	Missouri.
Hat Creek.....	Powell.....	6,000	22.26	25.75	Clark Fork.....	Clark Fork.
Haugan.....	Mineral.....	3,150	29.30	25.40	St. Regis.....	Clark Fork.
Havre.....	Hill.....	2,505	15.02	14.22	Milk.....	Missouri.
Heben Dam.....	Gallatin.....	6,700	16.90	29.06	Madison.....	Missouri.
Helena.....	Lewis and Clark.....	4,110	13.89	16.36	Missouri.....	Missouri.
Heron.....	Sanders.....	2,261	31.87	31.69	Clark Fork.....	Clark Fork.
Hightwood.....	Chouteau.....	4,300	24.21	23.90	Missouri.....	Missouri.
Huntley.....	Yellowstone.....	3,037	12.36	17.23	Yellowstone.....	Yellowstone.
Ingomar.....	Rosebud.....	3,042	13.86	p-1	Yellowstone.....	Yellowstone.
Iron Mountain.....	Mineral.....	2,763	q-1	18.77	Clark Fork.....	Clark Fork.
Kalispell.....	Flathead.....	2,965	11.59	18.48	Flathead.....	Clark Fork.
Knaples Ranch.....	Toole.....	.....	.....	r-1	Milk.....	Missouri.
Knowlton.....	uster.....	.....	.....	s-1	Powder.....	Yellowstone.
Kremmlin.....	Hill.....	2,826	.....	22.50	Milk.....	Missouri.
Lewisstown.....	Fergus.....	4,006	19.76	22.50	Judith.....	Missouri.
Libby.....	Lincoln.....	2,075	18.04	18.42	Kootenai.....	Kootenai.
Lima.....	Beaverhead.....	6,200	11.10	t-1	Jefferson.....	Missouri.
Lindsay.....	Dawson.....	.....	.....	u-1	Yellowstone.....	Yellowstone.
Livingston.....	Park.....	4,510	.....	v-1	Yellowstone.....	Yellowstone.

## U. S. WEATHER REPORTS ON PRECIPITATION IN MONTANA FOR 1914-1915—Continued.

Station	County	Elevation Feet	Precipitation— Inches		Tributary Basin	Drainage Basin
			1914	1915		
Lothair.....	Hill.....	3,301	13.11	w-1	Marias.....	Missouri.
Lytle.....	Chouteau.....		11.95		Marias.....	Missouri.
Malta.....	Phillips.....	2,250	13.42	16.03	Milk.....	Missouri.
Medicine Lake.....	Sheridan.....	1,969	13.31	14.60	Missouri.....	Missouri.
Melstone.....	Musselshell.....	2,903	13.87	21.29	Musselshell.....	Yellowstone.
Mildred.....	Prairie.....	2,354	14.31	17.89	Yellowstone.....	Yellowstone.
Miles City.....	Custer.....	2,371	13.97	22.41	Yellowstone.....	Yellowstone.
Missoula.....	Missoula.....	3,225	x-1	18.17	Clark Fork.....	Clark Fork.
Mt. Slickox.....	Sanders.....	.....	.....	v-1	Clark Fork.....	Clark Fork.
Norris.....	Madison.....	4,845	13.16	20.78	Madison.....	Missouri.
Ovando.....	Powell.....	4,050	17.68	19.10	Big Blackfoot.....	Clark Fork.
Penwell's Ranch.....	Roschud.....	.....	z-1	15.66	Yellowstone.....	Yellowstone.
Phillipsburg.....	Granite.....	5,273	15.99	19.54	Clark Fork.....	Clark Fork.
Pinegrove.....	Musselshell.....	.....	18.30	27.50	Musselshell.....	Missouri.
Plains.....	Sanders.....	2,473	20.80	17.92	Clark Fork.....	Clark Fork.
Pleasant Valley.....	Flathead.....	.....	a-2	.....	Fisher.....	Kootenai.
Plevna.....	Fallon.....	3,500	14.55	21.20	Yellowstone.....	Yellowstone.
Polson.....	Flathead.....	2,757	16.55	20.24	Flathead.....	Clark Fork.
Poplar.....	Sheridan.....	2,920	17.16	11.42	Missouri.....	Missouri.
Red Lodge.....	Cartoon.....	5,548	11.17	21.40	Clarke Fork.....	Yellowstone.
Renova.....	Jefferson.....	4,360	12.74	17.54	Jefferson.....	Missouri.
Ringling.....	Meagher.....	5,280	.....	b-2	Missouri.....	Missouri.
Rock Springs.....	Roschud.....	.....	.....	c-2	Yellowstone.....	Yellowstone.
Roundup.....	Musselshell.....	3,184	d-2	e-2	Yellowstone.....	Missouri.
Ryegate.....	Musselshell.....	3,640	f-2	g-2	Musselshell.....	Missouri.
Saco.....	Phillips.....	2,181	h-2	13.92	Milk.....	Missouri.
St. Ignatius.....	Missoula.....	2,911	17.93	21.88	Flathead.....	Clark Fork.
St. Mary's Lake.....	Teton.....	4,478	i-2	j-2	St. Mary.....	Clark Mary.
Savage.....	Richard.....	1,985	13.87	17.72	Yellowstone.....	Yellowstone.
Sidney.....	Richland.....	1,978	16.31	14.05	Yellowstone.....	Yellowstone.
Shelby.....	Toole.....	3,176	8.38	15.95	Marias.....	Missouri.
Snowbelt.....	Dawson.....	.....	k-2	17.60	Missouri.....	Missouri.
Springbrook.....	Dawson.....	.....	23.74	15.68	Missouri.....	Missouri.
Stacey.....	Custer.....	3,500	14.70	1-2	Tongue.....	Yellowstone.
Stevensville.....	Ravalli.....	.....	12.40	15.58	Bitterroot.....	Clark Fork.
Striker.....	Flathead.....	.....	m-2	25.11	Flathead.....	Clark Fork.
Sula.....	Ravalli.....	.....	.....	n-2	Wilk.....	Missouri.
Sunlit Farm.....	Blaine.....	3,170	13.20	13.23	Wilk.....	Missouri.
Sun River Canyon.....	Teton.....	4,650	11.37	22.35	Bitterroot.....	Clark Fork.
Sunset Orchard.....	Ravalli.....	4,000	0-2	17.14	Bitterroot.....	Clark Fork.
Superior.....	Mineral.....	2,975	.....	p-2	Clark Fork.....	Clark Fork.
Thompson Falls.....	Sanders.....	2,424	21.85	20.02	Clark Fork.....	Clark Fork.
Three Forks.....	Broadwater.....	4,400	14.09	15.72	Jefferson.....	Missouri.

U. S. WEATHER REPORTS ON PRECIPITATION IN MONTANA FOR 1914-1915—Continued.

Station	County	Elevation Feet	Precipitation Inches		Tributary Basin	Drainage Basin
			1914	1915		
Trout Creek.....	Sanders.....	2,375	25.92	9.2	Clark Fork.....	Clark Fork.
Upper Yaak River.....	Lincoln.....	2,800	17.2	8.5	Yaak.....	Kootenai.
Utica.....	Fergus.....	5,000	14.51	21.78	Ludith.....	Missouri.
Valentine.....	Fergus.....	2,800	12.19	12.26	Musselshell.....	Missouri.
Valier.....	Beeton.....	3,825	10.48	16.64	Marias.....	Missouri.
Victor.....	Beaton.....	3,537	10.07	13.82	Bitterroot.....	Clark Fork.
Wall Rock Mountain.....	Beaton.....	5,600	12.07	17.40	Missouri.....	Missouri.
Wheaton.....	Musselshell.....	5,280	11.67	13.95	Musselshell.....	Missouri.
White Sulphur Springs.....	Meagher.....	2,674	.....	20.71	Smith.....	Missouri.
White Water.....	Phillips.....	.....	.....	22.84	Little Missouri.....	Little Missouri.
Wibaux.....	Wibaux.....	.....	14.65	22.50	Missouri.....	Missouri.
Wilder.....	Fergus.....	3,460	17.31	22.27	Missouri.....	Missouri.
Wolf Creek.....	Jewell and Clark.....	.....	17.29	.....	Missouri.....	Missouri.
Zortman.....	Phillips.....	.....	.....	.....	.....	.....

## FOOT NOTES FOR PRECIPITATION TABLE.

	Precipitation at		Inches
a	"	Absarokee, Jan. 1914 .....	0.18
b	"	Augusta, January-August and October-December, 1915 .....	15.92
c	"	Babb, January and April-December, 1915 .....	29.17
d	"	Belton, January, February, April-June and July-December, 1915 .....	26.00
e	"	Bernice, May-October, 1915 .....	13.11
f	"	Big Prairie, August, 1914 .....	0.40
g	"	Big Prairie, August-October, 1915 .....	2.77
h	"	Blackleaf, January-June, August-October and December, 1915 .....	12.79
i	"	Boulder, April-December, 1915 .....	14.53
j	"	Box Elder, January-October, 1915 .....	14.23
k	"	Brenner, January-February and April-December, 1914 .....	12.43
l	"	Broadview, April-December, 1914 .....	13.09
m	"	Broadview, January-October and December, 1915 .....	17.85
n	"	Browning, January-April and June-December, 1915 .....	15.40
o	"	Cameron, January, February, April, May, Nov. and Dec., 1914 .....	5.41
p	"	Cameron, January-May, 1915 .....	9.52
q	"	Canyon Ferry, January-November, 1915 .....	10.07
r	"	Chester, January-September, 1914 .....	9.95
s	"	Chester, February-October, 1915 .....	12.01
t	"	Chinook, January-June and August-December, 1915 .....	9.74
u	"	Clear Creek, February-April and June-December, 1914 .....	14.03
v	"	Clear Creek, January-September and December, 1915 .....	18.63
w	"	Clear Lake, January-February, 1915 .....	1.78
x	"	Conrad, January-August, October and December 1914 .....	10.86
y	"	Conrad, January-June, November and December, 1915 .....	6.23
z	"	Cooke, January-June, August and September, 1914 .....	13.73
a-1	"	Culbertson, January-July and September, 1914 .....	10.73
b-1	"	Darby, May-October, 1914 .....	8.31
c-1	"	Ekalaka, January-February and April-December, 1915 .....	22.39
d-1	"	Farmington, June-December, 1915 .....	11.47
e-1	"	Flathead Creek, January-May, July and December, 1914 .....	14.31
f-1	"	Forsyth, January-February, 1914 .....	0.60
g-1	"	Garniel, January-July and September, 1915 .....	34.81
h-1	"	Geyser, January, April-August and October-December, 1914 .....	10.84
i-1	"	Glacier Park, January-April, July and August, 1915 .....	10.05
j-1	"	Glasgow, May-December, 1914 .....	15.90
k-1	"	Glentana, December, 1914 .....	0.53
l-1	"	Grass Range, July-December, 1914 .....	4.20
m-1	"	Grass Range, January-June and August-November, 1915 .....	12.08
n-1	"	Hamilton, January-June and August-October, 1915 .....	11.82
o-1	"	Harlowton, January-August, October and December, 1915 .....	13.37
p-1	"	Ingomar, January-March, 1915 .....	1.46
q-1	"	Iron Mountain, February-July and September-November, 1914 .....	9.23
r-1	"	Knowlton, February-December, 1915 .....	22.95
s-1	"	Kremlin, September-October, 1914 .....	2.61
t-1	"	Lima, January-May and July-December, 1915 .....	11.33
u-1	"	Lindsay, July-December, 1915 .....	8.42
v-1	"	Livingston, July-December, 1915 .....	8.22
w-1	"	Lothair, January-October, 1915 .....	14.72
x-1	"	Missoula, February-December, 1914 .....	13.84
y-1	"	Mount Silcox, August, 1915 .....	0.49
z-1	"	Penwell's Ranch, August-December, 1914 .....	3.26
a-2	"	Pleasant Valley, January-August, 1914 .....	15.77
b-2	"	Ringling, July-December, 1915 .....	8.31
c-2	"	Rock Springs, May-June and August-December, 1915 .....	7.50
d-2	"	Roundup, June-December, 1914 .....	10.33
e-2	"	Roundup, January-July, 1915 .....	12.93
f-2	"	Ryegate, January-May and August-December, 1914 .....	7.41
g-2	"	Ryegate, January-February and April-September, 1915 .....	13.92
h-2	"	Saco, December, 1914 .....	0.71
i-2	"	St. Mary's Lake, January, February and April-July, 1914 .....	8.72
j-2	"	St. Mary's Lake, April-December, 1915 .....	24.20
k-2	"	Snowbelt, December, 1914 .....	0.38
l-2	"	Stacey, January-April and December, 1915 .....	6.82
m-2	"	Stryker, July-October and December, 1914 .....	9.84
n-2	"	Sula, July-December, 1915 .....	8.85
o-2	"	Sunset Orchard, May-December, 1914 .....	8.21
p-2	"	Superior, January-March and May-December, 1915 .....	18.82
q-2	"	Trout Creek, June-December, 1915 .....	15.93
r-2	"	Upper Yaak River, May-December, 1914 .....	15.43
s-2	"	Upper Yaak River, January-November, 1915 .....	19.52
t-2	"	Wall Rock Mountain, January-April, 1914 .....	4.44
u-2	"	Wibaux, January-September, November and December, 1914 .....	12.44

**U. S. WEATHER STATIONS.**  
Located by Drainage Basins.

Drainage Basin	Tributary Basin.	Weather Stations.
Clark Fork of Columbia	Big Blackfoot..... Bitterroot..... Clark Fork..... Flathead..... St. Regis.....	Ovando. Como, Darby, Hamilton, Stevensville, Sula, Sunset Orchard, Victor. Anaconda, Butte, East Anaconda, Hat Creek, Heron, Iron Mountain, Missoula, Mt. Silcox, Phillipsburg, Plains, Superior, Thompson Falls, Trout Creek. Belton, Columbia Falls, Dayton, Kalispell, Polson, St. Ignatius, Stryker. Haugan.
Kootenai .....	Fisher..... Kootenai..... Tobacco..... Yaak.....	Pleasant Valley. Libby. Fortine. Upper Yaak River.
Little Missouri.....	Little Missouri.....	Ekalaka, Wibaux.
Missouri .....	Gallatin..... Jefferson..... Judith..... Madison..... Marias..... Milk..... Missouri..... Musselshell..... Smith..... Sun.....	Agricultural College. Bernice, Boulder, Bowen, Brenner, Dillon, Lima, Renova, Three Forks. Denton, Garniel, Lewistown, Utica. Cameron, Hebgen Dam, Norris. Blackleaf, Browning, Chester, Conrad, Cut Bank, Dunkirk, Farmington, Glacier Park, Gold Butte, Lothair, Lytle, Shelby, Valier. Box Elder, Chinook, Clear Creek, Glasgow, Havre, Knoble's Ranch, Kremlin, Malta, Saco, Sunlit Farm, White Water. Bald Butte, Canyon Ferry, Cascade, Clear Lake, Culbertson, Geyser, Glentana, Great Falls, Helena, Highwood, Medicine Lake, Poplar, Ringling, Snowbelt, Springbrook, Wall Rock Mountain, Wilder, Wolf Creek, Zortman. Broadview, Copper, Findon, Flatwillow, Grass Range, Harlowton, Melstone, Pinegrove, Roundup, Rygate, Valentine, Wheaton. Adel, White Sulphur Springs. Augusta, Fort Shaw, Sun River Canyon.
St. Mary .....	St. Mary.....	Babb, St. Mary's Lake.
Yellowstone .....	Bighorn..... Clark Fork..... Powder..... Shields..... Stillwater..... Tongue..... Yellowstone.....	Crow Agency. Bridger, Red Lodge. Graham, Knowlton. Clyde Park, Flathead Creek. Absarokee. Stacey. Big Timber, Billings, Busby, Busted, Cooke, Fallon, Forsyth, Foster, Glendive, Huntley, Ingomar, Lindsay, Livingston, Mildred, Miles City, Penwell's Ranch, Plevana, Rock Springs, Savage, Sidney.

## STREAM MEASUREMENTS.

### Explanation of Stream Flow Tables.

The tables showing the flow of various Montana streams have been computed from measurements made by a number of different parties. Part of the work has been done by the U. S. Geological Survey. In recent years the U. S. Reclamation Service has borne the expense of a great deal of the work by paying all expenses of maintaining the numerous gaging stations required in connection with the various Reclamation Service irrigation projects. For some years, the State Engineer's office of Montana has co-operated with the Water Resources Branch of the U. S. Geological Survey. A large part of the work done by the State has been in connection with Carey Act irrigation projects. The U. S. Forest Service has co-operated with the U. S. Geological Survey in measurements of some streams within the boundaries of the National Forests. Their measurements are of value largely for determining power possibilities.

For each regular gaging station are given, as far as available, such information about the locality as would enable the reader to find the station, the date it was established, the elevation of the station and of the headwaters of the stream, and the general character of the drainage area above the station. The tables consist of the monthly and yearly discharges in second-feet, and the run-off in acre-feet for the years of 1914-1915, and are supplementary to the data published in the Fifth and Sixth Biennial Reports, which contain similar summaries of all measurements made previous to 1914.

Following the tables for each station reference is made to the U. S. G. S. reports from which more detail information may be obtained.

In the following tables of stream flow the gaging stations are listed in downstream order. After all stations from the source to the mouth of the main stream have been given, the tributaries are treated in like manner, all stations in each tributary basin being given before taking up the next one below.

Following the stream flow data for the stations maintained in each drainage basin, will be found a list of miscellaneous measurements, which were not made at any of the regular gaging stations.

### Definitions.

The volume of water flowing in a stream—the “run-off” or “discharge”—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) those which represent a rate of flow, as second-feet, miner's inch, and run-off in second-feet per square mile; and (2) those which represent an actual quantity of water as run-off in depth in inches and acre-feet. They may be defined as follows:

“Second-foot” is an abbreviation for cubic foot per second, and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, and at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It has been commonly used by miners and irrigators throughout the west, and is defined by statute in each state in which it is used. In Montana the miner's inch is the fortieth part of a second-foot.

"Second-feet per square mile" is applied to the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly, both as regards time and area.

"Run-off depth in inches on drainage area" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used in comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work. There is a convenient relation between the second-foot and the acre-foot. One second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, or approximately 2 acre-feet.

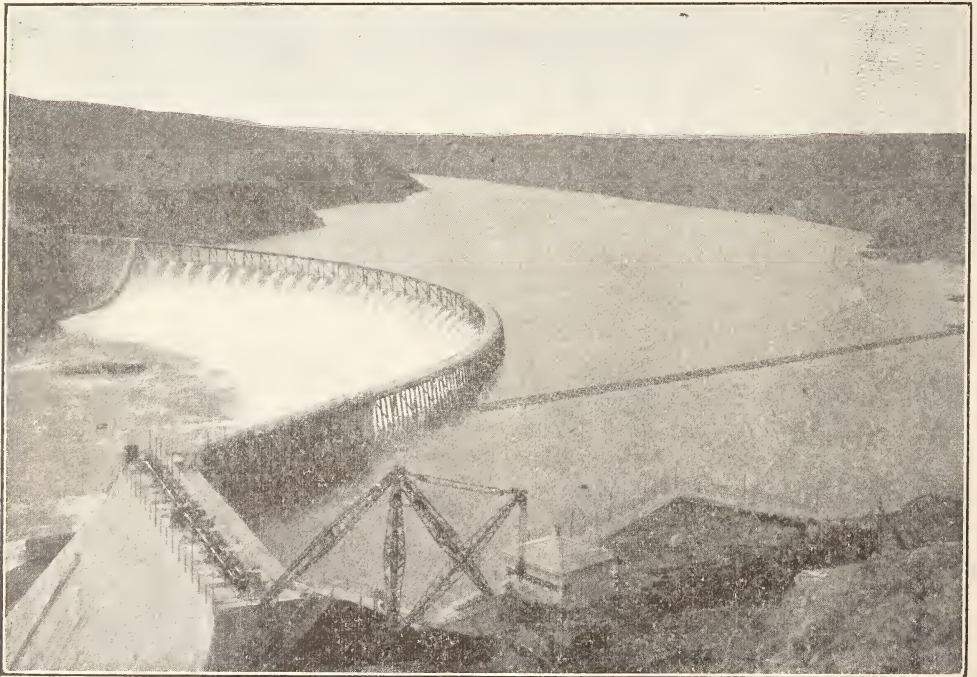
#### Table of Convenient Equivalents.

- 1 second-foot equals 40 Montana Statutory miner's inches.
- 1 second-foot equals about 1 acre-inch per hour, or enough to cover 1 acre 1 inch deep in 1 hour.
- 1 second-foot equals 2 acre-feet in 24 hours, nearly, or enough to cover 2 acres 1 foot deep, or 1 acre 2 feet deep, nearly.
- 1 second-foot equals 7.48 U. S. gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons per day.
- 1 miner's inch equals 11.22 gallons per minute.
- 1 miner's inch for 30 days will cover an acre 1.49 feet deep.
- 1 miner's inch, for the ordinary irrigating season of 150 days, will cover an acre 7.436 feet deep.
- 1 miner's inch flowing from April to September inclusive (183 days), will cover an acre 9.072 feet deep.
- 1 gallon equals 8.36 pounds of water.
- 1 gallon equals 231 cubic inches.
- 1 acre equals 209 feet square, nearly.
- 1 acre equals 43,560 square feet.
- 1 acre-foot equals 43,560 cubic feet.
- 1 acre-foot equals 325,850 gallons.
- 1 cubic foot equals 7.48 gallons.
- 1 cubic foot of water weighs 62.5 pounds.
- 1 foot per second equals 0.68 mile per hour.
- 1 second-foot falling 8.8 feet equals 1 horsepower.
- 1 second-foot falling 11 feet equals 1 horsepower at 80 per cent efficiency.

- 1 horsepower equals 33,000 pounds falling 1 foot in 1 minute.
- 1 horsepower equals 550 pounds falling 1 foot in 1 second.
- 1 horsepower equals 746 watts.
- 1 1-3 horsepower equals about 1 kilowatt.

### River Basins in Montana.

While there are tributaries of but three main river systems in Montana, namely, the Missouri, the Columbia and the St. Mary, still so far as the State itself is concerned, these are further divided. The Yellowstone and Little Missouri rivers leave the State before flowing into the Missouri. The Clark Fork of the Columbia River and the Kootenai River are separate tributaries of the Columbia. Thus we have in Montana six distinct basins, which are the Missouri, the Yellowstone, the Little Missouri, the Clark Fork of Columbia, the Kootenai, and the St. Mary.



BIG DAM BELOW GREAT FALLS.

## MISSOURI RIVER DRAINAGE BASIN

## RED ROCK RIVER.

Observation Station located in N. E. 1-4 Sec. 8, T. 14 S., R. 4 W., near Monida, Mont.

Established in 1910.

Elevation of Station about 7,000 feet.

Drainage Area about 400 square miles.

Character of Drainage Basin: A broad mountain valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
April 15-30 .....	1,030	471	848	26,900
May .....	805	427	576	35,400
June .....	566	275	433	25,800
July .....	328	130	204	12,500
August .....	130	100	114	7,010
September .....	186	122	142	8,450
The period .....				116,000
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	218	178	194	11,900
April .....	805	310	578	34,400
May .....	566	292	430	26,400
June .....	427	146	297	17,700
July .....	210	70	126	7,750
August .....	100	70	75.6	4,650
September .....	122	85	107	6,370

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## RED ROCK RIVER.

Observation Station Located in Sec. 32, T. 13.S, R. 6 W., Below Reservoir, Near Monida, Mont.

Established in 1910.

Elevation of Station, about 7,000 feet.

Drainage Area, about 560 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	340	252	282	17,300
November .....	280	146	189	11,200
December .....	149	29	41	2,520
January .....	30	15	18.8	1,160
February .....	17	15	15.2	844
March .....	18	15	16.7	1,030
April .....	1,220	15	502	29,900
May .....	1,100	540	718	44,100
June .....	590	468	560	33,300
July .....	360	141	228	14,000
August .....	133	77	96.3	5,920
September .....	119	104	109	6,490
The year .....	1,220	15	232	168,000
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	565	165	329	20,200
November .....	590	29	270	16,100
December .....	32	30	31.8	1,960
January .....	32	30	31.8	1,960
February .....	33	32	32.1	1,780
March .....	33	32	32.6	2,000
April .....	1,040	33	487	29,000
May .....	915	340	506	31,100
June .....	515	160	407	24,200
July .....	154	60	136	8,360
August .....	320	96	146	8,980
September .....	340	280	324	19,300
The year .....	1,040	29	228	165,000

Note: The flow at this point is regulated by the operation of the gates of the dam, which is about 150 yards above.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BEAVERHEAD RIVER.

Observation Station Located in S. W. 1-4 Sec. 20, T. 8 S., R. 9 W., at Barratts, Mont.  
 Established in 1907.  
 Elevation of Station, 5,260 feet.  
 Drainage Area, 2,720 square miles.  
 Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	700	600	660	40,600
November .....	700	500	638	38,000
December .....	500	265	324	19,900
March 22-31 .....	318	280	288	5,710
April .....	1,220	299	769	45,800
May .....	1,410	869	1,110	68,300
June .....	1,410	494	874	52,000
July .....	447	318	392	24,100
August .....	299	151	205	12,600
September .....	380	166	283	16,800
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	756	402	606	37,300
November .....	898	338	648	38,600
December .....	.....	228	286	17,600
January .....	280	181	229	14,100
February .....	262	212	230	12,800
March 1-13 .....	299	245	266	6,860
April 23-30 .....	1,220	1,140	1,200	19,000
May .....	1,220	359	919	56,500
June .....	1,660	447	839	49,900
July .....	986	338	476	29,300
August .....	543	402	417	25,600
September .....	674	402	591	35,200

Note.—Estimated, Dec. 9-29, Jan. 6-7 and 24-28.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## JEFFERSON RIVER.

Observation Station Located in Sec. 23, T. 2 S., R. 6 W., Near Silver Star, Montana.  
 Established in 1910.  
 Elevation of Station, 4,550 feet.  
 Drainage Area, 7,940 square miles.  
 Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	1,920	1,240	1,590	97,800
November .....	2,000	1,310	1,640	97,600
March 16-31 .....	1,380	1,060	1,210	38,400
April .....	3,530	1,060	2,520	150,000
May .....	7,530	2,870	5,030	309,000
June .....	8,610	4,220	5,420	323,000
July .....	3,990	715	2,030	125,000
August .....	670	460	554	34,100
September .....	1,450	520	965	57,400
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	2,000	1,350	1,850	114,000
November .....	2,000	1,500	1,890	112,000
March 21-31 .....	1,660	1,080	1,330	29,000
April .....	4,090	1,830	2,990	178,000
May .....	4,780	2,370	3,550	218,000
June .....	7,260	1,660	4,210	251,000
July .....	5,790	1,500	2,780	171,000
August .....	2,780	965	1,410	86,700
September .....	2,000	1,080	1,630	97,000

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MISSOURI RIVER.

Observation Station Located in S. W. 1-4 Sec. 23, T. 5 N., R. 2 E., at Toston, Mont.

Established in 1910.

Elevation of Station, 3,900 feet.

Elevation of Head Waters, 10,000 feet.

Character of Drainage Basin: Varies from mountains to broad irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	5,580	4,250	4,980	306,000
November .....	5,580	4,250	5,030	299,000
December .....	4,560	3,110	3,750	231,000
January .....	4,560	2,480	3,680	226,000
February (a) .....	.....	.....	3,960	220,000
March .....	5,230	3,660	4,350	267,000
April .....	8,710	3,660	6,330	377,000
May .....	19,900	7,480	13,000	799,000
June .....	19,900	7,080	12,400	738,000
July .....	7,080	2,850	4,130	254,000
August .....	2,850	1,730	2,240	138,000
September .....	3,950	1,820	2,880	171,000
The year .....	19,900	.....	5,570	4,030,000
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	5,580	4,250	5,050	311,000
November .....	5,230	3,660	4,330	258,000
December .....	3,380	1,730	2,850	175,000
January .....	3,180	2,240	2,730	168,000
February .....	5,580	4,560	5,210	289,000
March .....	6,310	4,560	4,970	306,000
April .....	9,650	5,230	6,950	414,000
May .....	9,990	6,690	8,420	518,000
June .....	13,100	5,940	10,800	643,000
July .....	10,400	4,560	6,800	418,000
August .....	6,310	3,380	4,330	266,000
September .....	8,300	3,660	4,910	292,000
The year .....	13,100	1,730	5,600	4,060,000

(a)—Discharge for February obtained at Canyon Ferry.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MISSOURI RIVER.

Observation Station Located In Sec. 35, T. 18 N., R. 1 W., at Cascade, Mont.

Established in 1902.

Elevation of Station, 3,380 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 18,300 square miles.

Character of Drainage Basin: Varies from mountains to irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	7,410	4,110	5,940	365,000
November	7,080	4,930	6,150	366,000
December	5,810		4,290	264,000
January			3,900	240,000
February			4,550	253,000
March	6,750	3,850	5,760	354,000
April	11,800	4,930	8,610	512,000
May	22,800	4,930	15,700	965,000
June	22,800	12,200	16,300	970,000
July	11,800	3,340	5,450	335,000
August	3,590	1,260	2,410	148,000
September	4,650	800	2,960	176,000
The year	22,800		6,840	4,950,000
Monthly Flow for Year ending Sept. 30, 1915.				
October	7,410	3,850	6,190	381,000
November	7,080	2,630	5,390	321,000
December			3,350	206,000
January			3,230	199,000
February			5,700	317,000
March			5,470	336,000
April	15,200	4,380	9,010	536,000
May	14,800	9,160	12,400	762,000
June	17,500	5,220	13,200	786,000
July	12,600	3,340	7,350	452,000
August	7,410	2,860	4,770	293,000
September	6,120	1,610	4,570	272,000
The year	17,500		6,710	4,860,000

Note: Estimated December 22, 1913 to March 5, 1914, and December 1, 1914, to April 8, 1915, by comparison with records at Canyon Ferry and Toston.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MISSOURI RIVER AT FORT BENTON.

Observation Station Located in N. E. 1-4 Sec. 26, T. 24 N., R. 8 E., at the Highway Bridge.

Established in 1881.

Elevation of Station 2,500 feet.

Drainage Area, 24,600 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	10,400	5,000	7,760	477,000
November	8,450	5,650	7,440	443,000
December	6,700	4,250	5,130	315,000
March 22-31	6,700	5,650	6,460	128,000
April	13,000	5,650	10,000	595,000
May	28,300	12,000	20,400	1,250,000
June	28,900	14,000	23,800	1,420,000
July	13,500	3,750	6,770	416,000
August	3,250	2,500	2,800	172,000
September	5,000	2,250	3,450	205,000
Monthly Flow for Year ending Sept. 30, 1915.				
August 12-31	8,100	5,000	6,210	246,000
September	7,750	4,500	6,440	383,000

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## RUBY RIVER.

Observation Station Located About 8 Miles South of Alder, Mont.

Established in 1911.

Elevation of Station, 5,400 feet.

Drainage Area, 540 square miles.

Character of Drainage Basin: Source in the mountains; irrigated meadows near the station.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....			179	11,000
November .....	166	219	186	11,100
December 1-6 .....	141	166	159	1,890
April 20-30 .....	337	245	289	6,300
May .....	935	275	630	38,700
June .....	935		661	39,300

Note: Called "Passamari" River in recent U. S. G. S. reports. Station discontinued June 30, 1914.

Reference for daily flow in U. S. G. S. Water Supply paper No. 386.

## MUSKRAT CREEK.

Observation Station Located in Sec. 6, T. 6. N., R. 3 W., 1,000 Feet Above Boulder Nursery. Near Boulder, Mont.

Established in 1912.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October 1-14 .....	4.1	1.4	2.71	75.2
April 10-30 .....	3.2	.8	1.85	77.1
May .....	27	2.6	13.2	812
June .....	33	8.6	16.7	994
July .....	7.6	2.5	4.80	295
August .....	2.4	1.4	1.86	114
September 1-24 .....	3.2	1.4	1.88	89.5

Reference for daily flow in U. S. G. S. Water Supply paper No. 386.

## DEEP CREEK.

Observation Station Located in Sec. 29, T. 7 N., R. 4 E., 12 Miles East of Townsend Mont. Established in 1910. Character of Drainage Basin: Mountainous.

There have been no discharge measurements, but some gage heights for 1914 and 1915 are published in U. S. G. S. Water Supply Papers 386 and 406.

## PRICKLEY PEAR CREEK.

Observation Station Located in Sec. 33, T. 9.N., R. 3 W., One Mile Below Clancy, Mont.

Established in 1908.

Elevation of Station, 4,200 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 178 square miles.

Character of Drainage Basin: Mountainous; a narrow irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	51	30	41.7	2,560
November	75	24	40.8	2,430
March 15-31	38	26	32.7	1,100
April	108	34	56.6	3,370
May	285	59	194	11,900
June	306	108	186	11,100
July	102	30	61.4	3,780
August	34	23	29.0	1,780
September	71	23	44.6	2,650
Monthly Flow for Year ending Sept. 30, 1915.				
October	71	48	60.8	3,740
November	59	46	49.4	2,940
April	83	32	56.5	3,360
May	121	61	77.7	4,780
June	465	77	262	15,600
July	179	95	141	8,670
August	128	48	75.7	4,650
September	95	48	71.4	4,250

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.



## TEN MILE CREEK.

Observation Station Located in N. E. 1-4 Sec. 20, T. 9 N., R. 5 W., Near Rimini, Mont.

Established in 1915.

Elevation of Station, 4,900 feet.

Elevation of Head Waters, 7,000 feet.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1915.				
March 13-31 .....	10.1	3.8	6.64	250
April .....	62	8.7	34.8	2,070
May .....	103	53	72.1	4,430
June .....	463	59	216	12,900
July .....	82	18	42.1	2,590
August 1-21 .....	27	7.5	13.7	571
The period .....				22,800

Reference: U. S. G. S. Water Supply paper No. 406.

## TENMILE CREEK.

Observation Station located in S. E. ¼ Sec. 22, T. 10 N., R. 4 W., at Broadwater Hotel, near Helena, Montana.

Established in 1908.

Elevation of Station, 4,000.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 105 square miles.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914				
October .....	38	2.2	14.0	861
November .....	21	7.4	13.2	786
December .....	9.0	4.2	6.2	381
January .....	8.0	5.0	6.4	394
February .....	7.0	4.0	5.3	294
March .....	11	5.0	7.7	473
April .....	156	11	65.0	3,810
May .....	424	99	246	15,100
June .....	238	58	141	8,390
July .....	58	1.8	17.2	1,060
August .....	1.2	.4	3.61	37.5
September .....	8	.2	3.65	217
The year .....	424	0.2	44.3	31,900
Monthly Flow for Year Ending Sept. 30, 1915				
October .....	44	4.0	19.5	1,200
November .....	19	10	15.0	893
December .....	13	5	7.5	461
January .....	11	5	7.0	430
February .....	8	5	6.8	378
March .....	15	6	9.8	603
April .....	86	15	47.9	2,850
May .....	92	53	73.5	4,520
June .....	424	86	276	16,400
July .....	141	12	66.8	4,110
August .....	62	3.6	18.2	1,120
September .....	15	4.3	7.46	444
The year .....	424	3.6	46.2	33,400

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LITTLE PRICKLY PEAR CREEK.

Observation Station located three miles north and five miles west of Marysville, Mont.  
 Established in 1913. (See note.)  
 Elevation of Station, 4,700 feet.  
 Elevation of Head Waters, 7,000 feet.  
 Drainage Area, 49 square miles.  
 Character of Drainage Basin: Mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October	18	15	17.4	1,070
November	15	15	15.0	893
December	15	8	9.9	609
January	8	5	6.8	418
February	.....	.....	a4.0	222
March	8	2	5.5	338
April	60	8	31.6	1,880
May	196	50	113	6,950
June	102	56	75.6	4,500
July	50	26	34.0	2,090
August	26	15	18.9	1,160
September	15	8	10.2	607
The year	196	.....	28.6	20,700
Monthly Flow for Year ending Sept. 30, 1915.				
October	18	12	17.4	1,070
November	18	15	15.7	934
December 1-15	15	8	12.7	378
March 15-31	5	5	5.0	169
April	40	5	23.3	1,390
May	62	26	41.5	2,550
June	180	26	79.9	4,750
July	52	29	38.3	2,360
August	33	18	24.2	1,490
September	25	18	19.8	1,180

a Monthly mean discharge estimated.

Note. Records were obtained above mouth of Deadman Creek from 1909 to 1911.  
 Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LITTLE PRICKLY PEAR CREEK.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 9, T. 12 N., R. 5 W., Near Canyon Creek.  
 Established in 1909.  
 Elevation of Station, 4,200 feet.  
 Elevation of Head Waters, 7,000 feet.  
 Drainage Area, 180 square miles.  
 Character of Drainage Basin: Mountainous; small irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	41	17	26.8	1,650
November	53	17	33.7	2,010
December	45	17	28.5	1,750
April	139	37	75.3	4,480
May	296	111	194	11,900
June	230	53	110	6,540
July	53	0.3	11.8	726
August	12	1.5	3.47	213
September	17	9.5	13.6	809
Monthly Flow for Year ending Sept. 30, 1915.				
October	45	10	30.8	1,890
November	45	23	34.7	2,060
December 1-12	30	17	23.0	547
March 14-31	41	23	32.8	1,170
April	74	24	48.7	2,900
May	63	3.5	41.2	2,530
June	250	0.2	58.7	3,490
July	49	18	31.2	1,920
August	63	9	36.0	2,210
September	37	18	31.4	1,870

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## NORTH FORK OF SUN RIVER.

Observation Station Located in Sec. 33, T. 22 N., R. 7 W., 12 Miles Northwest of Augusta.

Established in 1889.

Elevation of Station, 4,300 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 634 square miles.

Character of Drainage Basin: The greater part is mountainous.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	470	300	364	22,400
November	410	300	356	21,200
December	350	.....	206	12,700
January	330	.....	225	13,800
February	.....	130	187	10,400
March	.....	148	208	12,800
April	1,820	182	717	42,700
May	4,440	925	2,530	156,000
June	4,240	1,180	2,270	133,000
July	1,080	418	751	46,200
August	418	262	327	20,100
September	295	240	261	15,500
The year	4,440	130	702	509,000
Monthly Flow for Year ending Sept. 30, 1915.				
October	500	224	331	20,400
November	472	154	340	20,200
December	262	144	206	12,700
January	190	112	146	8,980
February	165	78	129	7,170
March	200	130	170	10,500
April	1,700	a15	704	41,900
May	3,850	1,480	2,110	130,000
June	2,500	1,270	1,750	104,000
July	2,500	1,080	1,400	86,100
August	1,180	390	720	44,300
September	660	445	512	30,500
The year	3,850	a15	714	517,000

Note: Discharge estimated Dec. 24, 1913 to March 10, 1914, and Nov. 27, 1914, to Feb. 28, 1915, because of ice conditions.

a. Estimated.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SUN RIVER.

Observation Located in S. W. ¼ Sec. 1, T. 20 N., R. 2 W., at Fort Shaw, Montana.

Established in 1912.

Elevation of Station, 3,500 feet.

Elevation of Head Waters, 8,000 feet.

Character of Drainage Basin: Mountainous and benchlands and valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
April	1,390	250	726	43,200
May	5,480	1,120	2,910	179,000
June	5,130	1,460	2,810	167,000
July	1,390	120	614	37,800
August	330	95	186	11,400
September	420	215	298	15,100
The period	.....	.....	.....	454,000
Monthly Flow for Year ending Sept. 30, 1915.				
October	510	255	436	26,800
November	610	255	423	25,200
December	292	160	230	11,100
January	190	160	170	10,500
February	222	130	168	9,330
March	292	130	239	14,700
April	1,300	50	623	37,100
May	5,630	1,430	2,220	136,000
June	3,360	1,430	1,950	116,000
July	2,640	1,170	1,610	99,000
August	1,300	415	760	46,700
September	820	415	572	34,000
The year	5,630	50	787	569,000

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## WILLOW CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 26, T. 21 N., R. 7 W., near Augusta, Montana.

Established in 1905.

Elevation of Station, 4,000 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 89 square miles.

Character of Drainage Basin: Mountains and irrigated valley land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	31	6.5	12.8	787
November	19	11	14.0	883
December 1-6	11	9.8	10.0	119
March 23-31	16	8.6	11.5	205
April	31	11.4	19.2	1,140
May	72	29	51.2	3,150
June	109	36	54.5	3,240
July	33	11	18.1	1,110
August	8.6	6.3	6.89	424
September	7.8	7.0	7.37	439
Monthly Flow for Year ending Sept. 30, 1915.				
October	9.4	7.8	9.15	563
November	11.4	9.1	9.79	533
December	8.6	6.1	7.06	434
January	7.8	7.0	7.45	458
February	7.8	6.3	7.31	403
March	11.4	7.8	8.65	532
April	19.0	8.6	11.4	678
May	103	25	67.3	4,440
June	132	48	84.2	5,020
July	93	46	55.5	3,410
August	53	23	35.7	2,200
September	53	22	30.6	1,820
The year	132	6.1	27.9	20,200

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SOUTH FORK OF SUN RIVER.

Observation Station Located in Sec. 17, T. 20 N., R. 6 W., at Augusta, Montana.

Established in 1904.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 154 square miles.

Character of Drainage Basin: Mountain and irrigated valley land.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	70	30	54.2	3,330
November	62	46	53.6	3,190
December 1-7	92	53	69.6	966
March 17-31	53	30	35.5	1,060
April	92	35	62.2	3,700
May	775	106	342	21,000
June	1,180	150	347	20,600
July	119	20	67.6	4,160
August	20	18	19.5	1,200
September	30	7.5	13.0	774
Monthly Flow for Year ending Sept. 30, 1915.				
October	40	20	32.2	1,980
November	40	20	26.3	1,560
March 14-31	27	27	27.0	964
April	47	34	41.0	2,440
May	407	88	226	13,900
June	766	142	362	21,500
July	200	133	164	10,100
August	200	79	119	7,320
September	108	62	85.1	5,060

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MARIAS RIVER.

Observation Station Located in Sec. 20, T. 31 N., R. 2 W., 7 miles south of Shelby, Mont.

Established in 1902.

Elevation of Station, about 3,200 feet.

Elevation of Head Waters, about 8,500 feet.

Drainage Area, 2,610 square miles.

Character of Drainage Basin: Timbered Mountains, benchlands and valeys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	825	265	544	33,400
November .....	700	550	618	36,800
December 1-13 .....	585	480	52.6	13,600
June 7-30 .....	1,660	850	1,190	56,600
July .....	770	195	428	26,300
August .....	260	170	187	11,500
September .....	345	170	219	13,000
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	980	322	603	37,100
November 1-7 .....	810	506	673	9,340
April .....	1,330	445	843	50,200
May .....	2,660	935	1,420	87,300
June .....	1,900	850	1,390	82,700
July .....	1,490	725	999	61,400
August .....	581	305	454	27,900
September .....	805	335	502	29,900

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## TWO MEDICINE RIVER.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 2, T. 31 N., R. 9 W., at Family, Mont.

Established in 1907.

Drainage Area, 368 square miles.

Character of Drainage Basin: Mountains and rolling bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	402	55	248	15,200
November .....	172	55	101	6,010
December (22 days) .....	102	43	93.9	4,100
March 17-31 .....	136	102	111	3,300
April .....	1,280	118	692	41,200
May .....	1,640	750	1,190	73,200
June .....	1,040	291	613	36,500
July .....	291	35	145	8,920
August .....	95	18	33.2	2,040
September .....	146	18	69.4	4,130
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	549	110	249	15,300
November .....	750	178	332	19,800
December .....	274	45	103	6,330
January .....	81	35	56.7	3,490
February .....	56	26	42.2	2,340
March .....	156	35	70.1	4,310
April .....	816	118	512	30,500
May .....	1,640	549	833	51,200
June .....	886	498	621	37,000
July .....	659	215	340	20,900
August .....	262	60	132	8,120
September .....	519	72	213	12,700
The year .....	1,640	26	293	212,000

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BADGER CREEK.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 19, T. 31 N., R. 8 W., near Family, Mont.

Established in 1907.

Drainage Area, 224 square miles.

Character of Drainage Basin: Mountains and rolling bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October .....	206	122	157	9,650
November .....	168	.....	145	8,630
June .....	677	244	454	27,000
July .....	262	126	184	11,300
August .....	133	106	116	7,130
September .....	112	92	102	6,070
Monthly Flow for Year ending Sept. 30, 1915				
October .....	197	96	129	7,930
November .....	172	126	149	8,870
December .....	126	67	87.8	5,400
April .....	277	96	166	9,880
May .....	441	230	319	19,600
June .....	504	286	378	22,500
July .....	400	230	332	20,400
August .....	230	136	166	10,200
September .....	235	165	217	12,900

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## CUTBANK CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 1, T. 33 N., R. 6 W., at Cutbank, Montana.

Established in 1905.

Elevation of Station about 3,600 feet.

Elevation of Head Waters, 8,500 feet.

Drainage Area, 971 square miles.

Character of Drainage Basin: Mountains and rolling bench lands.

Month.	Discharge in Second Feet			Run-off
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October .....	105	40	83.6	5,140
November .....	105	70	79.2	4,710
April 6-30 .....	265	135	213	10,600
May .....	545	190	360	22,100
June .....	485	163	288	17,100
July .....	170	40	108	6,640
August .....	40	25	43.4	2,670
September .....	105	40	67.9	4,040
Monthly Flow for Year ending Sept. 30, 1915				
October .....	232	60	134	8,240
November 1-15 .....	92	60	74.1	2,200
April .....	192	73	129	7,680
May .....	450	149	279	17,200
June .....	463	183	290	17,300
July .....	463	79	200	12,300
August .....	328	51	111	6,820
September .....	183	73	117	6,960

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BIRCH CREEK AT SWIFT DAM.

Observation Station Located About 20 Miles.W. of Dupuyer, Montana.

Established in 1913.

Character of Drainage Basin: Mountainous.

Drainage Area About 120 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October	188	70	108	6,640
November	112	70	89.1	5,300
December	77	48	62.8	3,860
January	63	49	54.3	3,340
February	51	39	44.9	2,490
March	57	38	44.6	2,740
April	236	50	134	7,970
May	545	222	344	21,200
June	420	168	277	16,500
July	178	72	107	6,580
August	72	55	64.3	3,950
September	162	1	61.6	3,670
The year	545	1	116	84,200
Monthly Flow for Year ending Sept. 30, 1915				
October	252	1	60.4	3,710
November	268	62	104	6,190
December	67	50	59.7	3,670
January	50	.....	7	430
February	.....	.....	1	55.5
March	.....	.....	1	61.5
April	53	.....	3	179
May	86	48	64.8	3,980
June	490	45	219	13,000
July	417	148	212	13,000
August	194	71	138	8,490
September	128	119	124	7,380
The year	490	.....	83.2	60,100

Reference for daily flow in U. S. G. S. Water Supply Nos. 386 and 406.

## BIRCH CREEK.

Observation Station Located in Sec. 28, T. 29 N., R. 8 W., 12 Miles Northwest of Dupuyer, Montana.

Established in 1907.

Character of Drainage Basin: Mountains and rolling benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October	200	90	136	8,360
November	143	101	120	7,140
December	.....	.....	95.0	5,840
January	.....	.....	65.0	4,000
February	.....	.....	50.0	2,780
March	.....	.....	56.2	3,460
April	247	56	148	8,810
May	445	204	334	20,500
June	445	178	270	16,100
July	175	88	122	7,500
August	88	64	73.8	4,540
September	64	59	62.6	3,720
The year	445	.....	128	92,800
Monthly Flow for Year ending Sept. 30, 1915				
October	171	24	69.9	4,300
November	263	64	96.6	5,750
December	104	.....	54.0	3,320
January	.....	.....	19.0	1,170
February	.....	.....	11.0	611
March	.....	.....	7.0	430
April	12.4	7.0	8.65	515
May	80	12	61.4	3,780
June	554	82	255	15,200
July	385	196	254	15,600
August	211	70	151	9,280
September	134	112	121	7,200
The year	554	.....	92.8	67,200

Reference for daily flow in U. S. G. S. Water Supply Nos. 386 and 406.

## BIRCH CREEK AT NELSON'S RANCH.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 27, T. 29 N., R. 8 W., near Dupuyer, Mont.

Established in 1914.

Character of Drainage Basin: Mountains and benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
May 8-31 .....	385	8	190	9,040
June .....	250	5.2	50.7	3,020
July .....	44	8.0	18.7	1,150
August .....	20	6.8	12.0	738
September .....	17	1.6	5.84	348
The period .....				14,300
Monthly Flow for Year ending Sept. 30, 1915				
October .....	22	0.0	6.58	405
November .....	59	.2	4.91	292
April .....	0.2	.0	0.01	0.6
May .....	27	.2	9.01	554
June .....	213	14.4	59.4	3,530
July .....	60	10.4	38.2	2,350
August .....	37	.8	28.3	1,740
September .....	51	23	40.4	2,400

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BIRCH CREEK AT HALL'S RANCH

Observation Station Located in N. W.  $\frac{1}{4}$ , Sec. 12, T. 29 N., R. 8 W., Near Dupuyer, MONT.

Established 1913.

Character of Drainage Basin: Mountains and rolling bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	180	10	104	6,400
November .....	140	98	112	6,660
December .....	.....	.....	97.5	6,000
March 15-31 .....	23	15	18.6	627
April .....	28	8	17.6	1,050
May .....	410	1.0	149	9,160
June .....	220	10	50.9	3,030
July .....	46	11	20.5	1,260
August .....	20	11	13.3	818
September .....	14	5.5	7.93	472
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	17	3.5	9.43	580
November .....	38	5.0	18.7	1,110
December 1-5 .....	33	28	31.2	309
March .....	27	2.6	12.1	744
April .....	3.8	1.4	2.65	158
May .....	50	1.4	13.2	812
June .....	200	5.0	66.8	3,970
July .....	92	13.2	42.5	2,610
August .....	48	11.6	34.5	2,120
September .....	64	36	49.0	2,920

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BIRCH CREEK.

Observation Station Located in the N $\frac{1}{2}$  Sec. 31, T. 30 N., R. 7 W., at Robare, Mont.  
Established in 1914.  
Character of Drainage Basin: Mountains and bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1915.				
June .....	23.	2.8	36.8	2,190
July .....	1.2	.5	3.21	197
August .....	1.0	.5	.62	38.1
September .....	1.0	.7	.76	45.2
The period .....				2,470.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	3.5	0.7	1.37	84.2
November .....	4.2	2.8	3.34	199
May .....	7.0	.4	2.05	126
June .....	190	2.4	37.9	2,260
July .....	59	5.4	29.1	1,790
August .....	29	4.8	20.7	1,270
September .....	49	23	34.8	2,070

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## DUPUYER CREEK

Observation Station Located in N. E.  $\frac{1}{4}$ , N. W.  $\frac{1}{4}$  Sec. 33, T. 29 N., R. 6 W., Near Valier, Mont.

Established in 1912.

Character of Drainage Basin: Mountains and bench lands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	78	13	41.6	2,560
November .....	61	28	40.9	2,430
December .....			*30	1,840
January .....			*32	1,970
February .....			*28	1,560
March .....			*25	1,540
April .....	63	31	47.1	2,800
May .....	351	48	95.5	5,870
June .....	149	47	74.4	4,430
July .....	47	11	22.6	1,390
August .....	18	4.4	10.2	627
September .....			*15	893
The year .....	351		38.6	27,900
Monthly Flow for Year ending Sept. 30, 1915.				
October 8-31 .....	43		28.6	1,360
November .....		17	24.6	1,460
March 16-31 .....			30.7	974
April .....	48	17	28.4	1,690
May .....	102	39	68.3	4,200
June .....	278	44	143	8,510
July .....	150	68	91.7	5,640
August .....	125	36	61.7	3,790
September .....	73	33	53.1	3,160

\*Estimated.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SEVENTH BIENNIAL REPORT OF THE STATE ENGINEER

## DRY FORK OF MARIAS RIVER.

Observation Station Located in S. E.  $\frac{1}{4}$  N. W.  $\frac{1}{4}$  Sec. 31, T. 29 N., R. 4 W., Near Valier, Mont.

Established in 1911.

Drainage about 125 square miles.

Character of Drainage Basin: Is entirely of rolling lands, with no mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	32	0	4.28	263
November .....	2.8	1.2	1.66	99
December (a) .....	.....	.....	1.5	92
January (a) .....	.....	.....	0.5	31
February a .....	.....	.....	1.0	56
March 21-31 .....	.....	.....	11.2	244
April .....	26	1.8	11.0	654
May .....	22	0.8	5.30	326
June .....	1.7	.2	.886	52.7
July .....	.2	0	.090	5.5
August 1-8 .....	0	0	0.0	0
* Monthly Flow for Year ending Sept. 30, 1915				
October 9-31 .....	24	0	4.14	189.
November 1-7 .....	.1	0	.....	.....
March 22-31 .....	344.	25.	89.2	1,770
April .....	27.	1.0	6.54	389.
May .....	4.0	.8	1.54	94.7
June .....	95	1.2	9.71	578
September 8-30 .....	6.4	.2	2.14	97.6

Note: The gage was installed at its present location Sept. 8, 1915, its former location being in the S. W.  $\frac{1}{4}$  Sec. 36, T. 29 N. R. 5 W.

(a) Estimated.

\* Other discharges recorded in 1915 are as follows July 4, 4 sec.-feet, July 11, 2.5 sec.-feet, July 18, 15.9 sec.-feet, July 25, 1.4 sec.-feet, and Aug. 19, 0.4 sec.-feet.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## TETON RIVER.

Observation Station Located in the S. E.  $\frac{1}{4}$  N. E.  $\frac{1}{4}$  Sec. 35, T. 25 N., R. 7 W., at Strabane, Mont.

Established in 1904.

Elevation of Head Waters, 8,000 feet.

Drainage Area, about 170 square miles.

Character of Drainage Basin: Mountains, bench lands and valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	97	74	86.2	5,300
November .....	89	81	85.5	5,090
December .....	81	53	69.1	4,250
January .....	53	30	45.4	2,790
February .....	42	28	33.4	1,850
March .....	46	25	36.9	2,270
April .....	84	30	50.4	3,000
May .....	380	97	247	15,200
June .....	410	162	276	16,400
July .....	162	81	114	7,010
August .....	80	61	70.4	4,330
September .....	61	52	54.1	3,220
The year .....	410	25	97.7	70,700
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	65	52	59.4	3,650
November .....	67	48	58.3	3,470
December .....	45	15	27.1	1,670
January .....	30	16	22.4	1,380
February .....	31	16	24.4	1,360
March .....	31	26	28.5	1,750
April .....	51	19	33.8	2,010
May .....	399	128	213	13,100
June .....	300	142	226	13,400
July .....	228	142	177	10,900
August .....	209	128	167	10,300
September .....	142	114	131	7,800
The year .....	399	15	97.9	70,800

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## TETON RIVER.

Observation Station Located on Augusta Road, 1½ Miles West of Choteau, Mont.

Re-established in 1913.

Character of Drainage Basin: Mountains, bench lands and valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1915				
April 14-30 .....	28	15	20.8	701
May .....	56	10	36.4	2,240
June .....	79	20	46.6	2,770
July .....	110	20	53.3	3,280
August .....	110	46	72.0	4,430
September .....	67	32	47.1	2,800
The period .....	110	10	48.1	16,200

Note: The following measurements were made in 1914: May 4, 78 sec.-feet, June 26, 48 sec.-feet.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## DEEP CREEK.

Observation Station Located in N. W. ¼ Sec. 15, T., 23 N., R. 5 W., Near Choteau, Mont.

Established in 1911.

Elevation of Head Waters, 8,000 feet.

Character of Drainage Basin: Mountains and benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	125	14	45.5	2,800
November .....	44	24	33.4	1,990
March 17-31 .....	58	33	44.0	1,310
April .....	86	33	53.5	3,180
May .....	212	82	135	8,300
June .....	182	58	112	6,660
July .....	51	14	23.4	1,440
August .....	24	14	16.2	996
September .....	20	11	14.4	857
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	44	12	27.0	1,660
November .....	33	22	28.7	1,710
December (a) .....	.....	.....	16.3	1,000
January (b) .....	.....	.....	13.0	799
February (b) .....	.....	.....	12.0	666
March (c) .....	67	.....	29.5	1,810
April .....	44	20	29.8	1,770
May .....	168	33	115	7,070
June .....	168	51	80.3	4,780
July .....	260	58	127	7,810
August .....	155	38	82.2	5,050
September .....	107	38	57.4	3,420
The year .....	260	.....	32.9	37,500

(a). Dec. 7-24 and 27 estimated.

(b). Estimated.

(c). Mar. 1-13 estimated.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## WILLOW CREEK.

Observation Station Located in Sec. 14, T..23 N., R. 6 W., 12 Miles Southwest of Cho-teau, Mont.

Established in 1912.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....	26	3.0	14.6	898
November .....	15	8.2	13.0	774
December 1-6 .....	10	8.2	9.37	112
April .....	58	11	30.0	1,790
May .....	70	23	39.9	2,450
June .....	64	8.5	21.4	1,270
July .....	7.5	0	1.62	99.6
Monthly Flow for Year ending Sept. 30, 1915.				
March 15-31 .....	47	17.6	31.0	1,050
April .....	32	.7	12.8	762
May .....	38	1.1	20.8	1,280
June .....	18.9	2.4	7.90	470
July .....	47	2.9	25.6	1,570
August .....	38	.2	14.9	916
September .....	30	2.4	12.4	738
The period .....				6,790

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MUDDY CREEK.

Observation Station Located in N. W.  $\frac{1}{4}$  S. E.  $\frac{1}{4}$  Sec. 22, T. 26 N., R. 6 W., Near Bynum, Mont.

Established in 1912.

Elevation of Head Waters, 7,500 feet.

Character of Drainage Basin: Mountains and benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year Ending Sept. 30, 1914.				
October .....			*1.0	61
November .....			*1.0	60
December .....			*.7	43
April .....	3.6	0.2	1.40	83.3
May .....			3.67	226
June .....	12	.5	2.74	163
July .....	1.2	.2	.43	26.4
August .....	.4	.1	.35	21.5
September .....	.5	.4	.49	29.2
Monthly Flow for Year ending Sept. 30, 1915.				
October 1-4 .....	5.2	0.5	1.68	13.3
April 14-30 .....	.8	.3	.51	17.2
May .....	1.0	.3	.49	30.1
June .....	1.0	.2	.52	30.9
July .....	5.0	.5	1.23	75.6
August .....	5.6	1.0	1.43	87.9
September .....	1.3	.8	1.00	59.5

\*Estimated

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BLACKLEAF CREEK.

Observation Station Located in SE.  $\frac{1}{4}$  Sec. 22, T. 26 N., R. 6 W., 2 Miles West of Bynum, Mont.

Established in 1912.

Character of Drainage Basin: Mountains and benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	40	.6	4.91	302
November .....	3.0	1.3	2.19	130
December .....	3.0	1.3	2.64	162
April .....	13	4.5	8.29	493
May .....	29	2.3	9.58	589
June .....	22	.5	5.58	332
July .....	4.5	.0	.78	48
August .....	.....	.....	.....	0.0
September .....	.....	.....	.....	0.0
Monthly Flow for Year ending Sept. 30, 1915.				
April 14-30 .....	4.5	.4	1.95	66
May .....	5.6	.1	1.00	61
June .....	94	.1	13.2	786
July .....	37	1.7	9.84	605
August .....	94	2.8	8.53	524
September .....	16	2.8	7.98	475
The period .....	.....	.....	.....	2,520

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## NORTH FORK OF MUSSELSHELL RIVER..

Observation Station Located in Sec. 6, T. 8 N., R. 12 E., 4 Miles North of Martinsdale, Mont.

Established in 1907.

Elevation of Station, 4,600 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 244 square miles.

Character of Drainage Basin: Mostly mountainous, with a narrow irrigated valley and some benchlands.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	57	25	34.6	2,130
November (a) .....	57	.....	31.5	1,870
April (a) .....	243	45	109	6,490
May .....	282	84	186	11,400
June .....	448	100	207	12,300
July .....	100	12	35.4	2,180
August .....	25	7	13.9	855
September .....	40	18	26.5	1,580

(a). Mean discharge Nov. 23 to 30 estimated at 25 sec.-feet, and April 1 to 4 at 100 sec.-feet.

Reference for daily flow in U. S. G. S. Water Supply paper No. 386.

## MUSSELSHELL RIVER.

Observation Station Located in Sec. 26, T..8 N., R. 15 E., at Harlowton, Mont.

Established in 1907.

Elevation of Station, 4,160 feet.

Elevation of Head Waters, 9,000 feet.

Drainage Area, 1,150 square miles.

Character of Drainage Basin: Mountainous, benchlands, and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	146	56	106	6,520
November (a) .....	111	.....	103	6,130
April .....	338	133	244	14,500
May .....	975	247	710	43,700
June .....	1,390	406	731	43,500
July .....	360	17	125	7,690
August .....	16	1	5.19	319
September .....	35	6	18.1	1,080
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	56	30	47.1	2,900
November .....	52	40	47.4	2,820
December 1-12 .....	52	30	42.1	1,000
March 14-31 .....	73	31	54.8	1,960
April .....	181	87	124	7,380
May .....	735	240	461	28,300
June .....	932	240	603	35,900
July .....	699	187	371	22,800
August .....	568	146	275	16,900
September .....	317	146	229	13,600

(a). Discharge Nov. 25-30, 1913, estimated at 100 sec. feet.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## CHECKERBOARD CREEK.

Observation Station Located in S. W. ¼ Sec. 4, T. 9 N., R. 9 E., Near Delpine,, Mont.

Established in 1909.

Elevation of Station, 5,500 feet.

Elevation of Head Waters, 7,000 feet.

Rainfall observed at Copper, Mont.

Drainage Area, 23 square miles.

Character of Drainage Basin: Steep, rocky, partially forested mountains.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year of 1914:				
April 12-30 .....	36	8	15.1	569
May .....	53	18	36.8	2,260
June .....	42	18	29.7	1,770
July .....	17	11	12.5	769
August .....	11	8	8.9	547
September .....	8	7	7.6	452
October .....	7	7	7.0	430
November .....	7	6	6.7	399
December .....	6	5	5.4	332
The period .....	.....	.....	.....	7,530

Station discontinued Dec. 31, 1914.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SOUTH FORK OF MUSSELSHELL RIVER.

Observation Station Located in Sec. 12, T. 8 N., R. 11 E., 1½ Miles East of Martinsdale, Mont.

Established in 1907.

Elevation of Station, 4,600 feet.

Elevation of Headwaters, 9,000 feet.

Drainage Area, 288 square miles.

Character of Drainage Basin: Mountains and irrigated valleys.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for the Year of 1914.				
March 15-31 .....	58	23	36.5	1,230
April .....	243	46	141	8,390
May .....	603	134	400	24,600
June .....	647	134	294	17,500
July .....	121	2.2	34.6	2,130
August .....	5.5	.9	2.57	158
September .....	26	2.6	10.6	631
October .....	46	22	36.7	2,260
November .....	51	31	40.1	2,390
The period .....	.....	.....	.....	59,300

Station discontinued Dec. 1, 1914.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## FLATWILLOW CREEK.

Observation Station Located in Sec. 23, T. 12 N., R. 25 E., 8 Miles Above Flatwillow Mont.

Established in 1911.

Elevation of Head Waters, 7,000 feet.

Drainage Area, about 175 square miles.

Character of Drainage Basin: Source in Big Snowy Mountains; flows through an irrigated valley.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914.				
October .....	44	22	31.2	1,920
November .....	44	32	37.1	2,210
December .....	48	32	38.6	2,370
March 26-31 .....	142	78	100	1,190
April .....	221	95	156	9,280
May .....	181	78	137	8,420
June .....	149	40	86.2	5,130
July .....	83	13	39.9	2,450
August .....	32	8	16.1	990
September .....	36	16	25.2	1,500
Monthly Flow for Year ending Sept. 30, 1915.				
October .....	30	18	22.8	1,400
November .....	26	22	24.5	1,460
March 18-31 .....	38	34	37.4	1,040
April .....	46	5	26.4	1,570
May .....	38	5	25.0	1,540
June .....	214	30	126	7,500
July .....	155	60	93.6	5,760
August .....	162	72	122	7,500
September .....	67	48	57.8	3,440

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SOUTH FORK OF MILK RIVER

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 29, T. 37 N., R. 9 W., 40 Miles North-east of Browning, Mont.

Established in 1905.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 288 square miles.

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October a	131	22	52.2	0.181	0.21	3,210
November a	51	20	31.2	.108	.12	1,860
December a	34	15	19.5	.068	.08	1,200
March 15-31	103	69	85.6	.297	.19	2,890
April a	488	116	220	.764	.85	13,100
May a	.....	64	120	.417	.48	7,380
June	124	35	63.2	.219	.24	3,760
July	37	6.6	17.3	.060	.07	1,060
August	47	4.4	14.4	.050	.06	885
September	25	9.0	16.7	.058	.06	994
Monthly Flow for Year ending Sept. 30, 1915						
October	222	11	62.7	.218	.25	3,860
November	.....	.....	35.6	.124	.14	2,120
December	.....	.....	17.7	.061	.07	1,090
January	15	9.0	12.3	.043	.05	756
February	20	10.4	15.2	.053	.06	844
March	237	13	73.5	.255	.29	4,520
April b	335	43	84.4	.293	.33	5,020
May b	263	55	125	.434	.50	7,690
June b	826	50	264	.917	1.02	15,700
July b	339	55	152	.528	.61	9,350
August b	160	30	62.9	.218	.25	3,870
September	388	29	118	.410	.46	7,020
The year	826	.....	85.4	.297	4.03	61,800

a Discharge estimated Oct. 30-Nov. 17, Dec. 11-31, and Apr. 26-May 15.

b Discharge estimated Apr. 18-21, May 31-June 2, June 10-13, June 30-July 12, and July 28-Aug. 4.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MILK RIVER AT INTERNATIONAL BOUNDARY.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 1, T. 1, R. 5 W., 4th Meridian, Alberta, or N. E.  $\frac{1}{4}$ , Sec. 6, T. 37 N., R. 9 E., 30 Miles North of Rudyard, Montana.

Established in 1913. (See note.)

Drainage Area, 2514 square miles. (a)

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	98	46	66	0.026	0.030	4,027
November	112	59	81	.032	.036	4,814
March 21-31	566	78.0	340	.135	.055	7,416
April	1,065	156.0	501	.199	.222	29,812
May	254	98.0	158	.063	.073	9,715
June	300	55.0	103	.041	.046	6,129
July	74	.9	26	.010	.012	1,599
August	44	.0	7.3	.003	.003	449
September	122	6.3	23.0	.009	.010	1,369
Monthly Flow for Year ending Sept. 30, 1915						
October	449	10.7	168	.067	.077	10,330
November b	98	36	65.1	.026	.029	3,868
December b	36	9	20.2	.008	.009	1,230
March 15-31 b	1,750	60	542	.216	.137	18,271
April	1,367	100	300	.119	.133	17,851
May	540	100	224	.089	.103	13,773
June	1,220	180	550	.219	.244	32,727
July	610	194	321	.127	.146	19,676
August	515	103	204	.081	.093	12,543
September	515	97	196	.078	.087	11,663

a Drainage area revised since publication of last report.

b Discharge estimated, Nov. 16 to Dec. 31, and March 15 to 31.

Note: Station maintained by Canada, 1909-1912.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MILK RIVER.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 5, T. 32 N., R. 16 E., at Havre, Montana.

Established in 1898.

Elevation of Station, 2,470 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 7,300 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October .....	123	20	60.4	3,710
November .....	70	58	63.6	3,780
December 1-9 .....	70	58	67.3	1,200
March 8-31 .....	1,080	97	451	21,500
April .....	945	159	437	26,000
May .....	243	83	151	9,280
June .....	281	57	119	7,080
July .....	97	0	26.4	1,620
August .....	7	0	1.49	91.6
September .....	83	1	16.2	964
Monthly Flow for Year ending Sept. 30, 1915				
October .....	549	5	154	9,470
March 23-31 .....	3,640	580	1,790	32,000
April .....	635	91	302	18,000
May .....	455	66	188	11,600
June .....	932	182	463	27,600
July .....	646	138	296	18,200
August .....	360	80	179	11,000
September .....	375	105	171	10,200

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MILK RIVER.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 17, T. 30 N., R. 30 E., at Malta, Montana.

Established in 1902.

Elevation of Station, 2,250 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 14,000 square miles.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October .....	360	31	82.9	5,100
November .....	281	85	144	8,570
March 23-31 .....	988	382	583	10,400
April .....	814	36	447	26,600
May .....	43	10	18.1	1,110
June .....	506	11	95.2	5,660
July .....	281	21	55.1	3,390
August .....	29	11	15.9	978
September .....	21	8	12.2	726
Monthly Flow for Year ending Sept. 30, 1915				
October .....	847	16	209	12,800
November .....	225	52	118	7,020
December 1-7 .....	80	64	70.3	976
March 22-31 .....	4,410	385	3,260	64,700
April .....	5,860	40	1,560	92,800
May .....	187	23	57.8	3,550
June .....	1,280	85	509	30,300
July .....	1,480	235	580	35,700
August .....	1,280	123	350	21,500
September .....	385	130	238	14,200

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MILK RIVER.

Observation Station Located in N. E.  $\frac{1}{4}$  S. W.  $\frac{1}{4}$  Sec. 33, T. 31 N., R. 36 E., at Hinsdale, Montana.

Established in 1908.  
Elevation of Station, 2,120 feet.  
Elevation of Head Waters, 7,000 feet.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
October 1-24 .....	90	35	54.2	2,580
April a .....	1,690	337	932	55,500
May .....	288	34	103	6,330
June .....	3,630	24	570	33,900
July .....	503	20	157	9,650
August .....	2,790	12	220	13,500
September .....	186	17	52.3	3,110
Monthly Flow for Year ending Sept. 30, 1915				
October .....	2,140	28	398	24,500
November 1-13 .....	288	128	191	4,920

a Discharge estimated April 1 to 3.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MILK RIVER AT VANDALIA DAM.

Observation Station Located About Four Miles Above Vandalia, Montana.  
Established in 1915.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1915				
May 5-31 .....	7,920	0.4	744	39,800
June .....	1,370	428	723	43,000
July .....	4,940	239	1,390	85,500
August .....	950	75	433	26,600
September .....	428	114	269	16,000
The period .....				211,000

Reference for daily flow in U. S. G. S. Water Supply paper No. 406.

## FORT BELKNAP CANAL.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 20, T. 33 N., R. 18 E., Near Chinook, Mont.  
Established in 1903.

Month.	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
April 7-30 .....	83	.....	43.0	2,050
May .....	96	55	74.8	4,600
June .....	63	5.4	30.6	1,820
July .....	25	.5	12.7	781
August .....	.7	.0	.22	13.5
The period .....				9,260
Monthly Flow for Year ending Sept. 30, 1915				
April 10-30 .....	80	10	56.8	2,370
May .....	80	52	67.5	4,150
June .....	61	0.5	16.3	970
July .....	37	2.2	15.2	935
August .....	12.5	0	9.2	566
September 1-19 .....	14.2	11	12.8	483
The period .....				9,470

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## PARADISE CANAL.

Observation Station Located 7 Miles Below Chinook, Montana.  
Established in 1903.

Month	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
April .....	24	0.3	13.4	558
May .....	20	5.7	10.6	652
June .....	9.8	0	4.56	271
July .....	3.2	0	0.95	22.6
The period .....				1,500
Monthly Flow for Year ending Sept. 30, 1915				
April 26-30 .....	19.2	1.1	11.1	110
May .....	16.4	5.3	9.20	566
June .....	12.8	2.2	7.68	451
July .....	6.6	.4	2.67	164
August .....	4.6	0	.566	35
September .....	1.2	0	.210	12
The period .....				1,340

Dry after July 11, 1914.

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## HARLEM CANAL.

Observation Station Located in S. W. ¼ Sec. 33, T. 33 N., R. 21 E., Near Zurich, Mont.  
Established in 1903.

Month	Discharge in Second Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
April .....	65	8	45.0	2,680
May .....	69	14	47.9	2,950
June .....	50	1.8	24.8	1,480
July .....	22	0	7.39	147
The period .....				7,260
Monthly Flow for Year ending Sept. 30, 1915				
April 8-30 .....	68	38	52.7	2,400
May .....	50	27	40.2	2,470
June .....	39	11	21.6	1,290
July .....	24	2.4	11.2	689
August 1-5 .....	8.9	2.1	4.62	46
The period .....				6,900

Dry after July 7, 1914.

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## AGENCY DITCH.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 33, T. 32 N., R. 23 E., at Ft. Belknap Agency, Near Harlem, Montana.  
Established in 1905.

Month	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
April .....	98	26	69.5	3,170
May .....	63	23	35.9	2,210
June .....	74	27	45.2	2,690
July .....	55	14	30.5	1,450
The period .....				9,520
Monthly Flow for Year ending Sept. 30, 1915				
April 14-30 .....	54	15	43.6	1,470
May .....	92	6	49.5	3,040
June .....	62	22	42.9	2,550
July 1-10 .....	23	20	22.0	436
The period .....				7,500

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## NORTH FORK OF MILK RIVER.

Observation Station Located at Peters' Ranch, About 18 Miles East of Kimball, Alberta.  
Established in 1909.  
Drainage Area, 101 square miles.  
Character of Drainage Basin: Plains.

Month	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October .....	71	21	31.0	0.307	0.35	1,906
November .....	47	21	27.6	.273	.30	1,642
December .....	23	14.1	17.5	.173	.20	1,076
January .....	18	12.3	14.8	.147	.17	910
February .....	16.4	11.2	13.6	.135	.14	755
March .....	43.0	16.8	30.4	.301	.35	1,869
April .....	517	15.5	61.5	.608	.68	3,654
May .....	52	16	26.0	.257	.30	1,599
June .....	26	14.3	18.3	.181	.20	1,089
July .....	18.5	12.8	14.8	.147	.17	910
August .....	31	11.1	15.2	.150	.17	935
September .....	17.9	12.4	14.8	.147	.16	881
The year .....	517	11.1	23.8	.236	3.19	17,200
Monthly Flow for Year ending Sept. 30, 1915						
October .....	125	14.9	38.9	0.385	0.44	2,332
November .....	103	19.2	30.6	.303	.34	1,821
December .....	32	15.2	20.1	.199	.23	1,236
January .....	16.8	14.9	15.8	.156	.18	972
February .....	18.8	16.4	17.2	.170	.18	955
March .....	178	19.1	65.0	.644	.74	3,997
April .....	190	17.0	41.0	.406	.45	2,440
May .....	87	22.0	37.0	.366	.42	2,275
June .....	231	26.0	120	1.19	1.33	7,140
July .....	190	70	102	1.01	1.15	6,272
August .....	127	50	68	.673	.78	4,181
September .....	297	48	78	.772	.86	4,641
The year .....	231	14.9	52.9	.524	7.10	38,322

Note: Discharge estimated Dec. 18, 1913, to April 13, and April 16-17, 1914.  
References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## BATTLE CREEK.

Observation Station Located in Sec. 3, T. 33 N., R. 19 E., Near Chinook, Montana.

Established in 1905.

Elevation of station, 2,420 feet.

Drainage Area, about 1,420 square miles.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	6.1	0.6	3.81	234
November .....	25	5.6	14.1	839
March 17-31 .....	478	68	154	5,190
April .....	650	54	162	9,640
May .....	112	3.3	35.4	2,180
June .....	26	0.4	3.71	221
July a .....	.3	.0	.064	3.9
Monthly Flow for Year ending Sept. 30, 1915				
October .....	996	0	80.0	4,920
November .....	18	7.5	12.7	756
April 8-30 .....	641	36	120	5,470
May .....	401	14	73.9	4,540
June .....	235	25	82.8	4,930
July .....	216	33	68.4	4,210
August .....	198	11	43.0	2,640
September .....	34	16	23.5	1,400

a Dry July 14 to Sept. 30, 1914.

Note. Formerly called North Fork of Milk River.

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## COOK CANAL.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 30, T. 33 N., R. 20 E., Near Chinook, Mont.

Established in 1905.

Month	Discharge in Second-feet.			Run-off
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
April .....	71	.....	32.2	2,150
May .....	48	4.2	24.2	1,490
June .....	39	.2	6.22	370
July .....	3.9	.0	1.51	44.9
The period .....	.....	.....	.....	4,050
Monthly Flow for Year ending Sept. 30, 1915				
April 7-30 .....	41	.0	22.4	1,070
May .....	44	.0	20.7	1,270
June .....	27	5.1	14.2	845
July .....	13.1	.3	6.15	378
August .....	6.6	.0	.56	34
The period .....	.....	.....	.....	3,600

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

Note: Dry after July 13, 1914.

## MATHESON CANAL.

Observation Station Located in N. W. ¼ Sec. 29, T. 33 N., R. 20 E., Near Chinook, Mont.

Established in 1905.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
April	24	.....	10.3	613
May	14	.3	4.52	273
June	5.6	0	.71	42.2
July	.4	0	.14	2.5
The period				936
Monthly Flow for Year ending Sept. 30, 1915				
April	30	0	4.73	281
May	20	0	5.71	351
June	14.8	2.1	5.77	343
July	5.6	0	2.11	130
August 1-24	5.5	0	1.10	52
The period				1.160

Note: Dry after July 8, 1914; April 13-May 1, 1915, and August 10-16, 1915.  
 References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## ROCK CREEK.

Observation Station Located in Sec. 10, T. 31 N., R. 36 E., 6 Miles Northeast of Hinsdale, Montana.

Established in 1912.

Elevation of Station, 2,160 feet.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	18	8	13.0	799
April	1,100	.4	190	11,300
May	8	1.2	3.25	200
June	1,360	.2	107	6,370
July	510	1.2	35.8	2,200
August	2,460	.4	318	19,600
September	44	6.0	14.9	887
Monthly Flow for Year ending Sept. 30, 1915				
October	3,200	3	186	11,400
November	18	6	11.7	696
March 23-31	775	184	514	9,180
April	1,550	2	218	13,000
May	6,350	0	520	32,000
June	745	28	124	7,380
July	835	6	89.5	5,500
August	16	2	6.7	412
September a	.....	.....	2.0	119

a Estimated.

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## PORCUPINE CREEK.

Observation Station Located in Center Sec. 36, T. 28 N., R. 41 E., at Nashua, Montana.  
 Elevation of Station, 2,050 feet.  
 Established in 1908.  
 Character of Drainage Basin: Rolling Prairie about 40 miles long.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
March 15-31 .....	101	31	49.8	1,680
April .....	429	3.2	84.1	5,000
May .....	4.2	0.8	2.06	127
June .....	445	0.5	51.0	3,039
July .....	86	0.5	16.9	1,040
August .....	220	0.5	22.7	1,400
September .....	27	.06	4.02	239
The period .....				12,500
Monthly Flow for Year ending Sept. 30, 1915				
October .....	4.7	0.6	2.01	124
November .....	1.9	1.3	1.41	84
April 10-30 .....	71	7.2	24.6	1,030
May .....	336	2.5	47.6	2,930
June .....	336	5.3	59.7	3,550
July .....	226	1.3	19.1	1,170
August .....	145	.1	17.6	1,080
September .....	3.8	.1	1.09	65

Reference for daily flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LITTLE PORCUPINE CREEK.

Observation Station Located in S. E.  $\frac{1}{4}$  N. E.  $\frac{1}{4}$  Sec. 28, T. 27 N., R. 44 E., Near Frazer, Montana.

Established in 1908.

Character of Drainage Basin: A narrow strip of land about 25 miles long.

Month	Discharge in Second-feet.			Run-off
	Maximum.	Minimum.	Mean.	Total Acre Feet.
Monthly Flow for Year ending Sept. 30, 1914				
June .....	102	0	14.7	875
July .....	60	0	9.74	599
August .....	7.5	0	.61	37.5
September .....	6.2	0	.63	37.5
The period .....				1,550
Monthly Flow for Year ending Sept. 30, 1915				
October .....			0.0	0
November .....			.0	0
April 10-30 .....	16.0	0.5	4.70	196
May .....	11.9	.0	2.26	139
June .....	16.6	.0	3.15	187
July .....	5.5	.0	1.14	70
August .....	3.0	.0	0.18	11
September .....			.0	0

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## WOLF CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 8, T. 27 N., R. 47 E., 2 1-2 Miles North-west of Wolf Point, Montana.

Established in 1908.

Elevation of Station, 2,000 feet.

Character of Drainage Basin: Rolling prairie.

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	.....	.....	Dry.	0.0
November 1-8 .....	.....	.....	Dry.	.0
April .....	55	0.3	7.92	471
May .....	129.5	.3	.38	23.4
June .....	.....	.3	11.4	678
July .....	.....	.7	5.73	352

Note: Discharge estimated April 1-4, June 8-14, 21-25, and July 10-26.

Station discontinued July 31, 1914.

Reference for daily flow in U. S. G. S. Water Supply paper No. 386.

## POPLAR RIVER.

Observation Station Located in S.  $\frac{1}{2}$  Sec. 8, T. 28 N., R. 51 E., Near Poplar, Montana.

Established in 1908.

Drainage Area, 3,660 square miles.

Character of Drainage Basin: Rolling prairie cut by small coulees.

Month	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	41	28	36.7	2,260
November .....	42	30	39.8	2,370
March 18-31 .....	1,720	260	621	17,200
April .....	2,920	101	762	45,300
May .....	101	51	68.8	4,230
June .....	557	44	106	6,310
July .....	1,120	65	164	10,100
August .....	2,130	51	180	11,100
September .....	92	65	70.9	4,220
Monthly Flow for Year ending Sept. 30, 1915				
April .....	1,240	85	338	20,100
May .....	800	41	173	10,600
June .....	321	34	124	7,380
July .....	268	15	75.5	4,640
August .....	71	6	28.1	1,730
September .....	47	5	27.8	1,650
The period .....	.....	.....	.....	46,100

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## BIG MUDDY CREEK.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 20, T. 29 N., R. 54 E., 15 Miles Northwest of Culbertson, Montana.

Established in 1908.

Character of Drainage Basin: Rolling prairie cut by small coulees.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	18	2	9.3	572
November 1-22	16	10	11.5	502
April	1,010	44	398	23,700
May	38	12	24.0	1,480
June	36	6	18.7	1,110
July	201	47	114	7,010
August	94	4	44.9	2,760
September	195	2	42.1	2,510
Monthly Flow for Year ending Sept. 30, 1915				
October	16	4	10.3	633
November 1-14	10	10	10.0	278
April 12-30	115	1	26.8	1,010
May	93	1	21.6	1,330
June	56	8	32.5	1,930
July	23	8	11.5	707
August	29	2	15.6	959
September	5	0	1.84	109

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

MISCELLANEOUS DISCHARGE MEASUREMENTS IN MISSOURI RIVER DRAINAGE BASIN DURING THE TWO YEARS ENDING SEPTEMBER 30, 1915.

Date	Stream	Tributary to	Locality	Discharge Sec. Ft.
Oct. 17, '13	S. Fk. Birch Cr....	Birch Creek.....	Above flow line of Swift Dam Reservoir .....	61
Dec. 5, '14	do.....	do.....	do.....	48.6
Jan. 2, '14	do.....	do.....	do.....	40.5
June 8, '15	Birch Creek.....	Two Medicine River..	Fisher's Ranch, near Valler .....	44.0
June 19, '15	do.....	do.....	do.....	33
July 6, '15	do.....	do.....	do.....	28.2
Aug. 4, '15	do.....	do.....	do.....	26.4
Oct. 17, '13	Phillips Creek.....	S. Fk. Birch Cr....	Above flow line of Swift Dam Reservoir .....	4.4
Dec. 5, '14	do.....	do.....	do.....	4.3
Jan. 2, '14	do.....	do.....	do.....	3.0
Oct. 16, '13	N. Fk. Birch Cr....	Birch Creek.....	do.....	32.1
Dec. 4, '14	do.....	do.....	do.....	20.9
Jan. 2, '14	do.....	do.....	do.....	17.2
Oct. 16, '13	Bear Creek.....	N. Fk. Birch Cr....	do.....	2.0
Dec. 4, '14	do.....	do.....	do.....	1.2
Jan. 2, '14	do.....	do.....	do.....	0.9
May 5, '14	Spring Cr.....	Teton R.....	Strabane .....	8.5
June 26, '14	do.....	do.....	do.....	3.1
Aug. 13, '14	do.....	do.....	do.....	0.8
April 14, '15	do.....	do.....	do.....	7.2
June 8, '15	do.....	do.....	do.....	4.6
May 8, '15	Milk River.....	Missouri River.....	Below Ft. Belknap Dam near Yantic .....	22.7
April 28, '15	Sage Creek.....	Big Sandy Cr.....	(At highway bridge on section line north and 1 mile east of Rudyard....	a 0.1
Oct. 27, '14	Wolf Creek.....	Missouri River.....	Wolf Point .....	2.8

a Estimated.

MISCELLANEOUS CANAL MEASUREMENTS IN MISSOURI RIVER DRAINAGE BASIN  
DURING THE TWO YEARS ENDING SEPTEMBER 30, 1915.

Date	Canal	Diverts from	Locality	Discharge Sec. Ft.
Aug. 4, '15	City Ditch (Helena)...	Ten Mile Creek.....	Moose Creek Ranger Station	4.6
Sept. 6, '14	Two Medicine Canal..	Two Medicine River..	On Browning Road near Family	23.2
April 10, '15	Griff Jones.....	Birch Creek.....	Swift Dam .....	3.3
May 7, '15	do.....	do.....	do.....	4.2
April 10, '15	Cote.....	do.....	do.....	1.9
May 7, '15	do.....	do.....	do.....	1.7
June 16, '15	do.....	do.....	do.....	5.9
June 8, '15	Fisher.....	do.....	Near Valier .....	5.3
May 5, '14	Teton Cooperative...	N. Bank Teton R.....	Strabane .....	Dry
June 26, '15	do.....	do.....	do.....	Dry
June 8, '15	do.....	do.....	do.....	33.7
May 5, '14	Upper Farmers'.....	do.....	do.....	a 0.9
June 26, '15	do.....	do.....	do.....	3.1
June 8, '15	Krofft.....	do.....	do.....	a 2.0
May 5, '14	do.....	do.....	do.....	7.0
June 26, '15	do.....	do.....	do.....	a 0.5
May 5, '14	Peebles.....	do.....	At road from Strabane to Choteau .....	Dry
June 26, '15	do.....	do.....	do.....	Dry
June 8, '15	do.....	do.....	do.....	1.5
May 5, '14	Fairburn.....	do.....	do.....	2.3
June 26, '15	do.....	do.....	do.....	a 1.5
June 8, '15	do.....	do.....	do.....	0.5
May 5, '14	Eldorado.....	do.....	do.....	12.8
June 26, '15	do.....	do.....	do.....	17.6
April 14, '15	do.....	do.....	do.....	24.6
June 8, '15	do.....	do.....	do.....	78
May 5, '14	Monkman.....	do.....	do.....	a 0.2
June 26, '15	do.....	do.....	do.....	2.7
June 8, '15	do.....	do.....	do.....	4.2
May 5, '14	Farmers'.....	do.....	do.....	14.8
June 26, '15	do.....	do.....	do.....	59
Aug. 13, '15	do.....	do.....	do.....	57
June 8, '15	do.....	do.....	do.....	68
May 5, '14	Cashman.....	do.....	do.....	Dry
June 26, '15	do.....	do.....	do.....	7.2
June 8, '15	do.....	do.....	do.....	8.3
May 5, '14	Daly.....	do.....	do.....	Dry
June 26, '15	do.....	do.....	do.....	a 2.5
Aug. 13, '15	do.....	do.....	do.....	3.6
May 5, '15	Burton.....	do.....	do.....	19.5
June 26, '15	do.....	do.....	do.....	62
Aug. 13, '15	do.....	do.....	do.....	7.8
April 14, '15	do.....	do.....	do.....	a 0.2
June 8, '15	do.....	do.....	do.....	33.9

a Estimated.



## YELLOWSTONE RIVER DRAINAGE BASIN

## YELLOWSTONE RIVER.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 30, T. 8 S., R. 8 E., at Corwin Springs, Montana.

Established in 1910.

Elevation of Station, about 5,000 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 2,630 square miles.

Character of Drainage Basin: Steep mountains, well timbered.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	2,250	1,530	1,800	111,000
November .....	1,530	1,230	1,390	82,700
December 1-14 .....	1,300	1,100	1,170	32,500
March 22-31 .....	1,160	1,040	1,120	22,200
April .....	1,910	1,160	1,480	88,100
May .....	11,300	1,710	6,660	410,000
June .....	14,900	8,230	10,600	631,000
July .....	8,760	4,180	5,950	366,000
August .....	4,010	2,020	2,790	172,000
September .....	3,520	1,620	2,070	123,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	2,740	2,010	2,280	140,000
November .....	2,130	1,310	1,620	96,400
December 1-12 .....	1,390	1,230	1,300	30,900
March 14-31 .....	1,160	1,040	1,100	39,300
April .....	5,980	1,160	2,610	155,000
May .....	6,400	2,490	4,270	263,000
June .....	7,720	4,790	6,300	375,000
July .....	6,400	3,280	4,940	304,000
August .....	4,420	1,890	2,850	175,000
September .....	2,130	1,480	1,880	112,000

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## YELLOWSTONE RIVER.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 24, T. 2 N., R. 27 E., at Huntley, Montana.

Established in 1907.

Elevation of Station, about 3,000 feet.

Elevation of Head Waters, 10,000 feet.

Drainage Area, 12,000 square miles.

Character of Drainage Basin: Varies from mountains to semi-arid bench lands.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	5,500	4,100	4,660	287,000
November .....	5,150	3,500	4,030	240,000
December .....	4,100	2,700	3,440	212,000
March a .....	4,010	.....	3,180	196,000
April .....	6,580	3,100	4,620	275,000
May .....	30,800	5,310	17,100	1,050,000
June .....	37,800	15,300	24,200	1,440,000
July .....	17,000	3,840	9,240	568,000
August .....	4,140	3,000	3,670	226,000
September .....	7,530	2,490	3,850	229,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	5,530	4,460	4,990	307,000
November .....	4,800	2,370	3,540	211,000
December 1-13 .....	2,620	2,020	2,280	58,900
March 21-31 .....	2,720	2,400	2,510	54,800
April .....	9,390	2,400	4,640	276,000
May .....	15,300	7,100	9,870	607,000
June .....	26,000	12,100	17,800	1,060,000
July .....	22,100	8,180	13,700	842,000
August .....	11,800	5,030	7,370	453,000
September .....	6,780	4,260	5,150	306,000

a Estimated March 1-12, 1914.

References for daily flow: U. S. G. S. Water Supply Papers 386 and 406.

## YELLOWSTONE RIVER.

Observation Station Located in N. W. ¼ Sec. 36, T. 18 N., R. 56 E., at Intake, Montana.

Established in 1911.

Elevation of Station, 2,000 feet.

Elevation of Head Waters, 10,000 feet.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	9,540	6,240	7,500	461,000
November	6,740	5,760	6,340	377,000
December	5,760	5,300	5,370	330,000
January	10,800	6,000	7,990	491,000
February	13,600	6,740	9,320	555,000
March	62,900	10,800	29,400	1,810,000
April	78,400	34,300	53,200	3,170,000
May	35,600	10,200	21,400	1,320,000
June	11,500	5,760	9,010	554,000
July	12,200	4,860	6,370	379,000
August				
September				
Monthly Flow for Year ending Sept. 30, 1915				
October	8,940	6,240	7,790	479,000
November	7,800	5,760	6,500	387,000
December	5,300	3,120	3,800	234,000
January a			3,120	192,000
February a			3,120	173,000
March a	11,500		5,550	341,000
April	12,200	6,240	8,580	511,000
May	24,400	10,200	16,600	1,020,000
June	94,200	16,800	45,500	2,710,000
July	72,200	18,600	34,400	2,120,000
August	38,100	10,800	17,800	1,090,000
September	26,400	8,940	12,900	768,000
The year	94,200		13,800	10,000,000

a Estimated January 1—March 18, 1915.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BIG TIMBER CREEK.

Observation Station Located About Nine Miles Northwest of Big Timber, Montana.

Established in 1912

Elevation of Station, about 4,600 feet.

Elevation of Head Waters, 10,000 feet.

Character of Drainage Basin: Mostly mountainous.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	52	24	36.7	2,260
November	36	21	30.1	1,790
December	24	19	20.5	1,244
January 1-6	36	16	28.5	904
March 16-31	80	28	48.2	2,870
April	338	68	191	11,700
May	937	180	377	22,400
June	360	44	224	13,800
July	44	18	25.4	1,560
August	102	18	34	2,020
September				
Monthly Flow for Year ending Sept. 30, 1915				
October	85	34	49.9	3,070
November	44	9	32.2	1,920
December	18	7	11.7	418
January 1-31	345	14	69.2	4,120
March	390	73	171	10,500
April	550	140	300	17,900
May	642	176	328	20,200
June	280	33	97.3	5,980
July	92	27	59.2	3,520
August				
September				

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

**BOULDER RIVER.**

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 14, T. 3 S., R. 12 E., Four Miles North of Contact, Montana.

Established in 1910.  
 Elevation of Station, 5,200 feet.  
 Elevation of Head Waters, 10,000 feet.  
 Drainage Area, 234 square miles.  
 Character of Basin: Very steep mountains, timbered.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	165	138	151	9,280
November .....	138	70	96.5	5,740..
March 15-31 .....	110	65	75.9	2,560
April .....	265	78	142	8,450
May .....	2,420	195	1,100	67,600
June .....	3,080	895	1,800	107,000
July .....	1,180	368	752	46,200
August .....	368	115	192	11,800
September .....	618	65	204	12,100
Monthly Flow for Year ending Sept. 30, 1915				
October .....	230	165	193	11,900
November .....	195	20	110	6,550
March 21-31 .....	90	20	37.7	823
April .....	765	65	248	14,800
May .....	1,040	140	447	27,500
June .....	2,460	535	1,260	75,000
July .....	2,040	535	971	59,700
August .....	675	165	338	20,800
September .....	230	140	172	10,200

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

**BOULDER RIVER.**

Observation Station Located About  $\frac{1}{2}$  Mile Below McLeod, Montana.

Established in 1912.  
 Elevation of Station, about 4,600 feet.  
 Elevation of Head Waters, 10,000 feet.  
 Character of Drainage Basin: Mountains and irrigated valleys

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year of 1914:				
April .....	365	85	187	11,100
May .....	2,650	320	1,420	87,300
June .....	4,650	1,820	2,820	168,000
July 1-11 .....	2,000	1,500	1,710	37,300
The period .....				304,000

Note: Station discontinued July 11, 1914.

Reference for Daily Flow in U. S. G. S. Water Supply paper No. 386.

**WEST BOULDER.**

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 16, T. 2 S., R. 13 E., at McLeod, Montana.

Established in 1907.  
 Elevation of Station, 4,700 feet.  
 Elevation of Head Waters, 10,000 feet.  
 Drainage Area, 137 square miles.  
 Character of Drainage Basin: Mountains and irrigated valley

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year of 1914:				
April .....	150	28	63.4	3,770
May .....	975	125	466	28,700
June .....	1,460	410	731	43,500
July 1-11 .....		320	406	8,860
The period .....				84,800

Note: Station discontinued July 11, 1914.

Reference for Daily Flow in U. S. G. S. Water Supply paper No. 386.

## SWEETGRASS CREEK.

Observation Station Located About Middle Sec., 27, T. 5 N., R. 13 E., About Nine Miles Above Melville, Montana.

Established in 1913. (See note.)  
Elevation of Station, about 5,400 feet.  
Character of Drainage Basin: Mountainous.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1913				
August 21-31 .....	68	54	61.5	1,340
September .....	68	42	58.3	3,470
The period .....				4,810
Monthly Flow for Year ending Sept. 30, 1914				
October .....	47	36	44.9	2,760
November .....	47	36	41.3	2,460
April .....	32	13	20.4	1,210
May .....	1,210	19	294	18,100
June .....	1,280	164	455	27,100
July .....	269	80	166	10,200
August .....	90	37	69.2	4,250
September .....	43	23	30.6	1,820
Monthly Flow for Year ending Sept. 30, 1915				
October .....	56	19	34.8	2,140
November .....	56	37	48.2	2,870
December 1-15 .....	37	19	25.5	759
April .....	600	11	33.5	1,990
May .....	500	123	220	13,500
June .....	615	178	293	17,400
July .....	730	210	341	21,000
August .....	291	80	147	9,040
September .....	123	80	93.7	5,580

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

Note: A station formerly maintained about seven miles upstream was discontinued in 1913.

## SWEET GRASS CREEK.

Observation Station Located in T. 4 N., R. 15 E., Six Miles Below Melville, Montana.

Established in 1909.  
Elevation of Station, 4,600 feet.  
Elevation of Head Waters, 9,500 feet.  
Drainage Area, 137 square miles.  
Character of Drainage Basin: Mountains and broad benches.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	114	55	83.6	5,140
November .....	98	62	75.1	4,470
March 22-31 .....	28	19	26.2	520
April .....	70	24	37.5	2,230
May .....	524	34	424	13,500
June .....	1,040	211	220	25,200
July .....	229	19	111	6,830
August .....	54	13	32.9	2,020
September .....	40	19	27.0	1,610
Monthly Flow for Year ending Sept. 30, 1915				
October 1-9 .....	47	28	40.4	721
April a .....	133	16	32.9	1,960
May .....	631	121	244	15,000
June .....	604	177	363	21,600
July a .....	604	229	393	24,200

a Estimated, April 1-7, July 25-28, 30 and 31, by comparison with the record at the upper station.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## STILLWATER RIVER.

Observation Station Located in S. E.  $\frac{1}{4}$  S. E.  $\frac{1}{4}$  Sec. 30, T. 3 S., R. 19 E., near Absarokee, Montana.

Established in 1910.

Elevation of Station, 3,950 feet.

Drainage Area, 923 square miles.

Character of Drainage Basin: Forested mountains, benchlands and valleys.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	730	475	598	36,800
November .....	650	325	495	29,500
April 6-30 .....	625	230	411	20,400
May .....	4,800	550	2,040	125,000
June .....	6,080	2,070	3,690	220,000
July .....	3,280	1,220	2,330	142,000
August .....	1,400	650	943	58,000
September .....	1,720	500	786	46,800

Discontinued September 30, 1914.

Reference for Daily Flow: U. S. G. S. Water Supply paper No. 386.

## ROSEBUD RIVER.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 36, T. 3 S., R. 18 E., at Absarokee, Mont.

Established in 1910.

Elevation of Station, 4,000 feet.

Drainage Area, 383 square miles.

Character of Drainage Basin: Varies from forested mountains to cultivated benches and valley.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	325	225	279	17,200
November .....	280	225	241	14,300
December 1-6 .....	242	225	239	2,840
April 13-30 .....	410	135	232	8,280
May .....	1,630	260	822	50,500
June .....	2,150	550	1,330	79,100
July .....	1,630	630	1,120	68,900
August .....	820	350	543	33,400
September .....	720	260	416	24,800

Discontinued September 30, 1914.

Reference for Daily Flow: U. S. G. S. Water Supply paper No. 386.

## PRYOR CREEK.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 35, T. 1 S., R. 27 E., near Coburn, Montana.

Established in 1911.

Elevation of Station about 3,350 feet.

Character of Drainage Basin: Hills and benchlands.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	111	23	46.7	2,870
November	60	32	40.2	2,390
December a	.....	.....	40	2,460
April	159	32	62.4	3,710
May	394	50	113	6,950
June	583	50	88.8	5,280
July	107	25	35.5	2,180
August	352	14	33.8	2,080
September	107	14	33.4	1,990
Monthly Flow for Year ending Sept. 30, 1915				
October	60	25	31.3	1,920
November	41	25	27.5	1,640
April	45	37	40.7	2,420
May	255	41	56.6	3,480
June	583	48	139	8,270
July	170	28	49.3	3,030
August	372	24	58.7	3,610
September	238	32	54.9	3,270

a Estimated.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## PRYOR CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 25, T. 2 N., R. 27 E., at Huntley, Mont.

Established in 1904.

Elevation of Station, about 3,050 feet.

Drainage Area, 800 square miles.

Character of Drainage Basin: Rolling prairie.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	196	36	70.9	4,360
November	92	28	54.9	3,270
December	65	40	55.6	3,420
January a	65	.....	53.8	3,310
February b	.....	.....	40	2,220
March a	65	15	39.4	2,420
April	196	31	80.6	4,800
May	382	40	104	6,400
June a	840	28	108	6,430
July	51	19	28.8	1,770
August	216	19	26.5	1,630
September	120	17	39.8	2,370
The year	840	15	58.6	42,400
Monthly Flow for Year ending Sept. 30, 1915				
October	82	40	58.8	3,620
November	65	40	57.2	3,400
December 1-10	65	51	54.5	1,080
March 18-31	158	33	62.9	1,750
April	50	41	44.4	2,640
May	258	40	62.2	3,820
June	660	26	123	7,320
July	158	20	32.1	1,970
August	306	22	51.5	3,170
September	282	22	53.9	3,210

a Partly estimated.

b Estimated.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## BIGHORN RIVER.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 13, T. 1 S., R. 33 E., Two Miles Above Hardin, Montana.

Established in 1904.

Elevation of Station, about 3,000 feet.

Elevation of Head Waters, about 11,500 feet.

Drainage Area, 20,700 square miles.

Character of Drainage Basin: Varies from high mountains to irrigated valleys.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	3,130	1,950	2,380	146,000
November 1-22 .....	2,340	1,860	2,050	89,500
March 15-31 .....	2,890	1,950	2,320	78,200
April .....	5,210	1,950	3,380	201,000
May .....	21,200	3,760	10,300	633,000
June .....	28,300	10,300	17,200	1,020,000
July .....	10,800	3,250	7,390	454,000
August .....	5,860	1,860	3,280	202,000
September .....	2,770	1,520	1,890	112,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	3,250	2,040	2,620	161,000
November .....	2,660	1,950	2,240	123,000
December 1-7 .....	2,340	1,680	1,990	27,600
March 19-31 .....	2,440	1,860	2,060	53,100
April .....	3,500	1,600	2,250	134,000
May .....	5,210	1,950	3,510	216,000
June .....	26,100	7,320	15,000	893,000
July .....	15,100	4,600	8,790	540,000
August .....	8,230	2,770	4,010	247,000
September .....	18,000	2,770	5,380	320,000

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## SOAP CREEK.

Observation Station Located in Sec. 20, T. 5 S., R. 32 E., Nine Miles South of St. Xavier, Montana.

Established in 1911.

Elevation of Head Waters, 6,500 feet.

Character of Drainage Basin: Hills and benchlands.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	45	22	27.9	1,790
November .....	39	22	27.2	1,690
April 25-30 .....	55	36	43.0	512
May .....	302	19	45.5	2,800
June .....	34	12	19.1	1,140
July .....	17	5.7	11.5	707
August .....	22	7.5	13.1	806
September .....	31	1.0	10.8	643
Monthly Flow for Year ending Sept. 30, 1915				
October .....	28.0	9.3	20.1	1,240
November .....	26.5	18.4	20.5	1,220
December 1-5 .....	22.0	19.5	20.8	206
April 10-30 .....	22.0	8.0	11.0	458
May .....	34.0	10.0	16.9	1,040
June 1-12 .....	340	12.7	60.8	1,450
July .....	78.0	19.0	30.6	1,880
August .....	28.0	15.0	18.0	1,110
September .....	49.0	14.0	18.9	1,120

Note: Beginning April 25, 1914, the station was located about one-half mile above the present site, until June 12, 1915.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## ROTTENGRASS CREEK.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 6, T. 5 S., R. 33 E., About 4 Miles Southeast of St. Xavier, Montana.

Established in 1911.

Elevation of Station, 3,150 feet.

Elevation of Head Waters, 7,500 feet.

Character of Drainage Basin: Hills and benchlands.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	17	7	12.2	750
April 26-30	35	26	30.2	300
May	122	15	33.4	2,050
June a	13	2.0	3.67	218
July	23	6.0	12.5	769
August	17	1.0	4.27	263
September	19	8	11.5	684
Monthly Flow for Year ending Sept. 30, 1915				
October	23	12	21.3	1,310
November	26	21	22.5	1,340
December 1-4	26	23	24.8	197
April	12.0	4.3	6.32	376
May	46	3.6	13.0	799
June	416	29.0	110	6,550
July	235	10.0	56.9	3,500
August	16	5.0	9.45	581
September	16	7.0	11.3	672

a Estimated, June 21-July 1.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LITTLE BIGHORN RIVER.

Observation Station Located in N.  $\frac{1}{2}$  S. W.  $\frac{1}{4}$  Sec. 28, T. 8 S., R. 35 E., Four Miles Southwest of Wyola, Montana.

Established in 1911.

Elevation of Station, 4,800 feet.

Elevation of Head Waters, 9,500 feet.

Drainage Area, 260 square miles.

Character of Drainage Basin: Mountainous.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	132	105	116	7,130
November	122	98	105	6,250
March 16-31	111	86	91.2	2,890
April	255	93	134	7,970
May	1,010	132	505	31,100
June	800	255	455	27,100
July	255	122	170	10,500
August	132	111	124	7,690
September 1-6	122	111	120	1,430
Monthly Flow for Year ending Sept. 30, 1915				
April 8-30	193	82	113	5,150
May	895	116	317	19,500
June	1,130	91	496	29,500
July	373	166	244	15,000
August	180	127	144	8,850
September	135	120	128	7,620
The period	1,130	82	246	85,600

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LITTLE BIGHORN RIVER.

Observation Station Located in W.  $\frac{1}{2}$  Sec. 18, T. 3 S., R. 35 E., Near Crow Agency, Mont.

Established in 1905.

Elevation of Station, 3,040 feet.

Elevation of Head Waters, 9,500 feet.

Drainage Area, 1,190 square miles.

Character of Drainage Basin: Mountains and rolling prairies.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
March 16-31 .....	340	188	278	8,820
April .....	570	370	418	24,900
May .....	2,500	340	1,080	66,400
June .....	1,560	315	794	47,200
July .....	445	155	228	14,000
August .....	170	94	126	7,750
September .....	170	94	131	7,800
The period .....	.....	.....	.....	177,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	170	140	158	9,720
November .....	170	140	149	8,870
December 1-9 .....	170	170	170	3,030
April .....	428	120	184	10,900
May .....	1,340	330	637	39,200
June .....	3,600	650	1,280	76,200
July .....	1,550	330	535	32,900
August .....	403	158	224	13,800
September .....	284	120	190	11,300

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## LODGEGRASS CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 29, T. 6 S., R. 35 E., About Six Miles Southwest of Lodgegrass, Montana.

Established in 1911.

Elevation of Station, 3,650 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 142 square miles.

Character of Drainage Basin: Hills and benchlands.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	32	25	27.9	1,790
November .....	33	25	29.2	1,740
April .....	143	39	83.8	4,990
May .....	194	94	132	8,120
June .....	211	94	159	9,460
July .....	94	14	53.6	3,300
August .....	14	14	14.0	861
September .....	30	14	17.1	1,020
Monthly Flow for Year ending Sept. 30, 1915				
October .....	22	14	17.2	1,060
November 1-23 .....	22	14	19.4	885
April .....	118	14	27.9	1,660
May .....	247	50	138	8,480
June .....	695	160	258	15,400
July .....	177	56	94.0	6,090
August .....	66	24	50.0	3,070
September .....	39	24	33.5	1,990

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.

## MISCELLANEOUS DISCHARGE MEASUREMENTS IN YELLOWSTONE RIVER DRAINAGE BASIN DURING THE TWO YEARS ENDING SEPTEMBER 30, 1915.

Date	Stream	Tributary to	Locality	Discharge Sec. Ft.
1914 May 8	W. Fk. Rock Cr.....	Rock Creek.....	Ranger station near Red Lodge .....	42.7

## LITTLE MISSOURI RIVER DRAINAGE BASIN

### LITTLE MISSOURI RIVER.

Observation Station Located at Walker's Ranch, About Four Miles Below Alzada, Montana.

Established in 1911.

Drainage Area, about 780 square miles.

Character of Drainage Basin: Hilly and broken prairie.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	265	3.8	30.5	1,880
November .....	5.8	4.2	4.96	295
December .....	8	4.2	6.21	382
April .....	8	3.8	3.22	192
May .....	365	2.2	49.4	3,040
June .....	106	1.6	25.1	1,490
July .....	2,100	.1	128	7,870
August .....	2,400	6	190	11,700
September .....	9	3	4.9	292
Monthly Flow for Year ending Sept. 30, 1915				
October .....	577	2.8	41.0	2,520
November .....	8.8	2.8	4.90	292
March 28-31 .....	1,390	349	934	7,410
April .....	1,450	12.0	248	14,800
May .....	641	4.8	81.4	5,010
June .....	3,500	13.0	586	34,900
July .....	1,520	25.0	314	19,300
August .....	1,770	27.0	235	14,400
September .....	140	10.0	33.1	1,970

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 386 and 406.



## KOOTENAI RIVER DRAINAGE BASIN

### KOOTENAI RIVER.

Observation Station Located in Sec. 3, T. 30 N., R. 31 W., at Libby, Montana.

Established in 1910.

Character of Drainage Basin: Mountainous, heavily forested.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	8,920	6,280	7,260	446,000
November .....	6,280	4,530	5,560	331,000
December .....	5,370	2,760	3,730	229,000
January .....	7,560	2,940	4,260	262,000
February .....	3,780	1,690	3,130	174,000
March .....	5,670	3,330	4,300	264,000
April .....	17,300	4,270	11,500	684,000
May .....	43,500	15,000	30,700	1,890,000
June .....	56,900	24,700	37,000	2,200,000
July .....	39,000	13,300	25,400	1,560,000
August .....	13,300	7,560	10,100	621,000
September .....	9,280	6,280	7,360	438,000
The year .....	56,900	1,690	12,600	9,100,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	9,650	7,230	8,000	492,000
November .....	12,800	6,280	8,570	510,000
December a .....	6,280	.....	4,270	263,000
January a .....	.....	2,500	3,270	201,000
February .....	3,060	2,530	2,790	155,000
March .....	5,370	2,620	3,540	218,000
April .....	20,800	4,530	11,300	672,000
May .....	27,600	15,900	19,600	1,210,000
June .....	34,000	15,900	21,200	1,260,000
July .....	28,800	16,800	20,600	1,270,000
August .....	15,900	8,920	11,700	719,000
September .....	8,920	5,970	6,840	407,000
The year .....	34,000	.....	10,200	7,380,000

a Estimated, Dec. 13 to Jan. 17.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

### CALLAHAN CREEK.

Observation Station Located in Sec. 13, T. 31 N., R. 34 W., Near Troy, Montana.

Established in 1911.

Occasional gage heights are the only data available for 1914-1915.

References: U. S. G. S. Water Supply papers Nos. 392 and 412.

### YAAK RIVER.

Observation Station Located Near North Line of T. 32 N., R. 34 W., About Ten Miles North of Troy, Montana.

Established in 1914.

Character of Drainage Basin: Timbered mountains.

This station replaces the one formerly maintained in Sec. 33, T. 34 N., R. 33 W. No rating has been obtained, occasional gage heights are available, and the following measurement was made: March 2, 1914, 276 second-feet.

References: U. S. G. S. Water Supply papers Nos. 392 and 412.

## CLARK FORK OF COLUMBIA RIVER DRAINAGE BASIN

## CLARK FORK.

Observation Station Located in Sec. 7, T. 19 N., R. 26 W., Near Plains, Montana.

Established in 1910.

Elevation of Station 2,470 feet.

Elevation of Head Waters 9,000 feet.

Drainage Area, 19,900 square miles.

Character of Drainage Basin: Varies from glacier-fed lakes and dense mountain forests to irrigated valleys.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	9,030	8,720	8,740	537,000
November .....	9,350	8,720	9,070	540,000
December .....	9,030	6,850	8,040	494,000
January .....	7,600	6,620	7,410	456,000
February .....	8,720	5,970	7,360	409,000
March .....	10,700	7,600	8,590	528,000
April .....	27,800	8,420	16,900	1,010,000
May .....	67,000	27,100	48,900	3,010,000
June .....	62,300	36,700	49,200	2,930,000
July .....	35,100	14,600	28,800	1,460,000
August .....	14,100	8,720	10,600	652,000
September .....	8,720	8,420	8,480	505,000
The year .....	67,000	5,970	17,300	12,500,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	11,900	8,130	9,830	604,000
November .....	16,600	11,100	14,200	845,000
December .....	11,900	7,860	9,510	585,000
January .....	9,100	7,200	7,970	490,000
February .....	8,050	7,090	7,350	408,000
March .....	7,600	6,850	7,130	441,000
April .....	24,400	7,860	15,500	922,000
May .....	35,900	26,400	31,200	1,920,000
June .....	37,400	32,800	35,400	2,110,000
July .....	32,800	19,400	26,500	1,630,000
August .....	18,800	10,400	14,400	885,000
September .....	10,700	9,350	9,960	593,000
The year .....	37,400	6,850	15,800	11,400,000

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## CLARK FORK NEAR ST. REGIS, MONT.

Observation Station Located In Sec. 19, Twp. 18 N., R. 27 W.

Established in 1910.

Elevation of Station, 2,650 feet.

Drainage Area, 10,700 square miles.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	4,230	2,780	3,700	228,000
November .....	4,230	3,230	3,810	227,000
December .....	3,230	2,620	2,800	172,000
January .....	3,230	2,620	2,830	174,000
February .....	2,980	.....	2,720	151,000
March .....	7,480	3,100	4,440	273,000
April .....	15,200	4,420	9,920	590,000
May .....	34,000	13,500	25,000	1,540,000
June .....	28,000	10,200	19,000	1,130,000
July .....	9,200	3,720	6,280	386,000
August .....	3,720	2,620	3,000	184,000
September .....	3,380	2,480	2,890	172,000
The year .....	34,000	.....	7,220	5,230,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	5,240	3,100	4,110	253,000
November .....	6,120	4,230	4,950	295,000
December .....	4,230	2,410	2,980	183,000
January .....	3,230	2,200	2,590	159,000
February .....	2,980	2,200	2,710	151,000
March .....	4,420	2,620	3,190	196,000
April .....	10,500	3,890	7,000	417,000
May .....	14,200	7,720	10,600	652,000
June .....	17,300	11,700	15,000	893,000
July .....	11,400	5,900	8,650	532,000
August .....	6,340	3,100	4,300	264,000
September .....	4,230	2,980	3,770	224,000
The year .....	17,300	2,220	5,830	4,220,000

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## RACE TRACK CREEK.

Observation Station Located in Sec. 15, T. 6 N., R. 11 W., Near Anaconda, Montana.

Established in 1911.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 38 square miles.

Character of Drainage Basin: Mountainous.

No discharge measurements were made, but some gage heights are available.

References: U. S. G. S. Water Supply papers Nos. 392 and 412.

## LITTLE BLACKFOOT RIVER NEAR ELLISTON, MONTANA.

Observation Station Located in S. W. ¼ Sec. 30, T. 9 N., R. 6 W.

Established in 1910.

Drainage Area, 59 square miles.

Gage heights were read during 1914 and 1915, but no discharge measurements were made.

References: U. S. G. S. Water Supply papers Nos. 392 and 412.

## WEST FORK OF BITTERROOT RIVER.

Observation Station Located in Sec. 27, T. 2 N., R. 21 W., Near Darby, Montana.

Established in 1910.

Drainage Area, 572 square miles.

Character of Drainage Basin: Mountainous.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
November .....	227	192	210	12,500
March .....	310	.....	229	14,100
April .....	1,300	340	760	45,200
May .....	3,200	765	2,070	127,000
June .....	3,050	798	1,430	85,100
July .....	865	271	477	29,300
August .....	290	106	167	10,300
September .....	290	106	168	10,000
Monthly Flow for Year ending Sept. 30, 1915				
July .....	975	370	647	39,800
August .....	370	150	252	15,500

Note: Occasional daily discharge records are available for the other months of 1915.  
Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## EAST FORK OF BITTERROOT RIVER.

Observation Station Located in S. E. ¼ Sec. 21, T. 2 N., R. 20 W., Near Darby, Mont.

Drainage Area, 340 square miles.

Character of Drainage Basin: Mountainous.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
March a .....	102	85	87.9	5,400
April .....	320	94	202	12,000
May .....	1,360	238	860	52,900
June .....	1,540	379	744	44,300
July a .....	.....	162	264	16,200
August a .....	.....	.....	104	6,400
The period .....	.....	.....	.....	137,000

a Estimated, March 1-5, July 1-10, August 1-11, and 25-31. Occasional observations were made in 1915, but complete data is not available for any month.

References: U. S. G. S. Water Supply papers Nos. 392 and 412.

## LOLO CREEK.

Observation Station Located in Sec. 34, T. 12 N., R. 21 W., Near Lolo, Montana.

Established in 1910.

Elevation of Station, 3,470 feet.

Elevation of Head Waters, 7,000 feet.

Drainage Area, 249 square miles.

Character of Drainage Basin: Mountains, forested.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	85	66	75.4	4,640
November .....	99	66	82.5	4,910
December a .....	.....	.....	75	4,610
January a .....	.....	.....	70	4,300
February a .....	.....	.....	55	3,050
March .....	186	78	142	8,730
April .....	857	129	508	30,200
May .....	1,600	768	1,160	71,300
June .....	1,000	375	706	42,000
July .....	388	124	247	15,200
August .....	122	56	82.5	5,070
September .....	106	47	80.2	4,770
The year .....	1,600	.....	274	199,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	180	108	142	8,730
November .....	195	137	157	9,340
December 1-6 .....	142	122	128	1,520
March 20-31 .....	137	60	89.2	2,120
April .....	471	196	350	20,800
May .....	567	315	419	25,800
June .....	840	471	611	36,400
July .....	479	130	194	11,900
August .....	144	85	104	6,400
September .....	130	82	114	6,780

a Estimated.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## ST. REGIS RIVER.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 28, T. 18 N., R. 28 W., Near St. Regis, Mont

Established in 1910.

Drainage Area, 278 square miles.

Character of Drainage Basin: Mountainous and forested.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	185	90	123	7,560
November .....	185	90	162	9,640
March 7-31 .....	1,120	238	629	31,200
April .....	2,840	580	1,750	104,000
May .....	2,710	1,040	1,900	117,000
June .....	1,120	330	617	36,700
July .....	330	150	229	14,100
August .....	150	120	145	8,920
September .....	330	150	204	12,100
Monthly Flow for Year ending Sept. 30, 1915				
October .....	202	150	175	10,800
November .....	1,040	220	590	35,100
March 16-31 .....	580	185	422	14,200
April .....	1,900	765	1,130	67,200
May .....	830	580	671	41,300
June .....	640	220	388	23,100
July .....	255	120	190	11,700
August .....	120	85	110	6,760
September 1-11 .....	150	85	109	2,380

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## FLATHEAD RIVER.\*

Observation Station Located in Sec. 7, T. 31 N., 19 W., 10 Miles North of Columbia Falls, Montana.

Established in 1910.

Drainage Area, 1,620 square miles.

Character of Drainage Area: A mountainous, densely forested valley; river is fed by glaciers and mountain streams.

Month	Discharge in Second-feet.			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	1,670	960	1,210	74,400
November .....	1,240	960	1,100	65,500
December .....	960	570	809	49,700
January .....	1,340	570	901	55,400
February .....	790	350	623	34,600
March .....	790	510	647	39,800
April .....	5,280	790	3,110	185,000
May .....	12,400	4,620	8,730	537,000
June .....	13,300	4,840	7,380	439,000
July .....	4,840	1,730	3,190	196,000
August .....	1,850	1,240	1,470	90,400
September .....	1,910	1,140	1,380	82,100
The year .....	13,300	350	2,550	1,850,000
Monthly Flow for Year ending Sept. 30, 1915				
October .....	4,040	1,560	2,280	140,000
November .....	4,840	1,790	2,940	175,000
December .....	1,560	960	1,190	73,200
January .....	1,140	790	839	57,700
February .....	960	710	804	44,700
March .....	1,100	640	803	49,400
April .....	7,300	1,140	3,780	225,000
May .....	7,600	3,860	5,360	330,000
June .....	8,200	3,860	4,960	295,000
July .....	6,220	2,330	3,540	218,000
August .....	2,330	1,240	1,680	103,000
September .....	1,340	1,140	1,190	70,800
The year .....	8,200	640	2,460	1,780,000

\* Called also, "North Fork of Flathead river."

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## FLATHEAD RIVER.

Observation Station Located in T. 22 N., R. 21 W., Twelve Miles Below Polson, Montana.

Established in 1907.

Drainage Area, 7,010 square miles.

Character of Drainage Basin: Mountainous above Columbia Falls, below which the valley is broad and fertile.

Month	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	4,330	3,230	3,800	0.542	0.62	234,000
November	4,500	3,880	4,240	.605	.68	252,000
December	4,500	3,230	3,690	.526	.61	227,000
January	3,350	2,400	3,120	.445	.51	192,000
February	3,010	2,790	3,000	.428	.45	167,000
March	3,120	2,690	2,890	.412	.48	178,000
April	14,400	3,230	7,100	1.01	1.13	422,000
May	41,000	14,400	26,700	3.81	4.39	1,640,000
June	36,500	23,100	30,000	4.28	4.78	1,790,000
July	22,000	9,930	15,400	2.20	2.54	947,000
August	9,620	4,020	6,670	.951	1.10	410,000
September	4,850	3,740	4,040	.576	.64	240,000
The year	41,000	2,400	9,250	1.32	17.93	6,700,000
Monthly Flow for Year ending Sept. 30, 1915						
October	6,520	4,170	5,320	0.759	0.88	327,000
November	9,930	6,060	8,370	1.19	1.33	498,000
December	7,820	4,170	5,640	.805	.93	347,000
January	4,330	3,010	3,630	.518	.60	223,000
February	3,120	2,490	2,790	.398	.41	155,000
March	2,900	2,310	2,490	.355	.41	153,000
April	12,400	2,900	6,510	.929	1.04	387,000
May	21,000	13,200	18,200	2.60	3.00	1,120,000
June	19,000	17,100	18,100	2.58	2.88	1,080,000
July	19,000	12,800	16,200	2.31	2.66	996,000
August	13,200	6,520	9,740	1.39	1.60	599,000
September	6,290	4,500	5,260	.750	.84	313,000
The year	21,000	2,310	8,560	1.22	16.58	6,200,000

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## MIDDLE FORK OF FLATHEAD RIVER.

Observation Station Located in T. 32 N., R. 19 W., at Belton, Montana.

Established in 1910.

Elevation of Station, 3,200 feet.

Elevation of Head Waters, 8,500 feet.

Drainage Area, 900 square miles.

Character of Drainage Basin: Densely forested mountains.

Month	Discharge in second-feet.			Run-off.
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
November 12-30	1,100	650	891	33,600
December	710	342	493	30,700
January a	.....	.....	424	26,100
February a	.....	.....	403	22,400
March	960	380	668	41,100
April	6,190	830	3,620	215,000
May	11,500	4,630	7,300	449,000
June 1-8	10,000	3,770	7,160	114,000
September 14-30	1,240	485	628	21,200
Monthly Flow for Year ending Sept. 30, 1915				
October	1,670	510	1,100	67,600
November	2,300	1,100	1,440	85,700
December	1,240	265	492	30,300
March	928	182	474	29,100
April	6,400	895	3,140	187,000
May	6,820	2,410	4,170	256,000
June	6,400	3,170	3,969	236,000
July	3,770	1,770	2,620	162,000
August	1,770	830	1,170	71,900
September	1,400	830	1,060	63,100

a Estimated, Jan. 5-Feb. 17.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## SOUTH FORK OF FLATHEAD RIVER NEAR COLUMBIA FALLS, MONTANA.

Observation Station Located in N. W.  $\frac{1}{4}$  S. W.  $\frac{1}{4}$  Sec. 4, T. 30 N., R. 19 W.

Established in 1910.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 1,640 square miles.

Character of Drainage Basin: Mountainous, forested.

There were but few readings taken, from which the following discharges were obtained:

1913: Oct. 1, 520 second-foot; Oct. 6, 785 second-foot; Oct. 16, 1,100 second-foot; and Oct. 17, 1,360 second-foot.

1914: April 5, 5,290 second-foot; April 26, 6,410 second-foot; April 30, 5,290 second-foot; May 3, 11,600 second-foot; May 11, 10,900 second-foot; May 17, 22,200 second-foot; May 28, 12,300 second-foot; June 6, 13,700 second-foot; June 17, 10,200 second-foot; June 30, 5,030 second-foot; July 11, 3,380 second-foot; Aug. 17, 940 second-foot; Sept. 15, 645 second-foot; Sept. 20, 4,290 second-foot; Oct. 12, 883 second-foot; and Oct. 17, 2,570 second-foot.

1915: April 3, 3,380 second-foot; May 5 and May 14, 4,780 second-foot; May 23 and May 27, 5,290 second-foot; June 2, 5,030 second-foot; June 16, 5,560 second-foot; June 25, 7,300 second-foot; July 4, 4,530 second-foot; July 10, 3,820 second-foot; July 25, 5,030 second-foot; Aug. 2 and Aug. 3, 2,760 second-foot; Aug. 11, 1,570 second-foot; Aug. 28, 1,420 second-foot; Sept. 3, 1,170 second-foot; Sept. 4, 1,300 second-foot; Sept. 8, 735 second-foot; Sept. 10, 940 second-foot, and Sept. 28, 2,960 second-foot.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## LITTLE BITTERROOT RIVER.

Observation Station Located in T. 27 N., R. 24 W., Near Marion, Montana.

Established in 1910.

Drainage Area, 52 square miles.

Character of Drainage Basin: Mountainous and forested.

Month	Discharge in Second-foot			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	2.6	1.5	1.90	117
November .....	1.5	1.5	1.50	89
December .....	1.5	.8	1.18	73
April .....	10.3	5.0	6.94	413
May .....	11.9	7.3	10.5	646
June .....	10.3	5.2	7.43	442
July .....	8.0	.6	4.54	279
August .....	.8	.6	.62	38
September .....	1.2	.8	.85	51
Monthly Flow for Year ending Sept. 30, 1915				
October .....	3.8	0.8	2.81	173
November .....	1.2	.8	.87	52
December .....	1.6	1.2	1.32	81
January .....	1.4	0	.29	18
February .....	.6	.1	.37	21
March .....	1.2	.5	.74	46
April .....	.8	.1	.51	30
May .....	3.0	.1	1.06	65
June .....	2.8	.1	1.23	73
July .....	2.5	.8	1.35	83
August .....	5.8	.1	1.14	70
September .....	5.8	3.0	3.83	228
The year .....	5.8	0	1.30	940

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## LITTLE BITTERROOT RIVER.

Observation Station Located in T. 25 N., R. 24 W., Near Hubbart, Montana.

Established in 1909.

Drainage area, 194 square miles.

Character of Drainage Basin: Mountainous and forested.

Month	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	12	6	10.5	646
November 1-14 .....	10	6	7.6	211
April .....	61	23	47.0	2,800
May a .....	.....	28	46.6	2,870
June .....	26	18	22.9	1,360
July .....	18	8	12.6	775
August .....	8	2	4.4	271
September .....	3	2	2.6	155
Monthly Flow for Year ending Sept. 30, 1915				
October .....	2.4	1.4	1.90	117
November .....	7.7	1.4	3.13	186
April .....	64	22	37.0	2,200
May .....	45	25	33.4	2,050
June .....	37	13	20.5	1,220
July .....	16	10	13.2	812
August .....	14	6.8	9.38	577
September .....	12	7.1	10.2	607

a Estimated May 1-17.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## CROW CREEK.

Observation Station Located in S. W.  $\frac{1}{4}$  Sec. 13, T. 20 N., R. 20 W., Four Miles South of Ronan, Montana.

Established in 1906.

Drainage Area, 52 square miles.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	125	20	39.6	2,430
November .....	44	28	31.9	1,900
December .....	26	20	23.1	1,120
January .....	25	17	19.9	1,220
February .....	.....	.....	17.0	944
March .....	22	14.5	19.3	1,190
April .....	69	17	35.9	2,140
May .....	260	57	152	9,350
June .....	367	59	164	9,760
July .....	72	24	46.9	2,880
August .....	39	5	14.9	916
September .....	18.2	3.3	5.74	342
The year .....	367	3.3	47.6	34,500
Monthly Flow for Year ending Sept. 30, 1915				
October .....	159	14	45.6	2,800
November .....	55	35	47.4	2,820
December 1-12 .....	33	25	27.0	643
March .....	85	47	60.6	3,730
April .....	243	57	110	6,550
May .....	248	97	187	11,500
June .....	378	151	194	11,500
July .....	378	62	188	11,600
August .....	54	28	35.1	2,160
September .....	164	30	47.6	2,820

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## CROW CREEK.

Observation Station Located in E. ½ Sec. 15, T. 20 N., R. 21 W., at Lozeau's Ranch Near Ronan, Montana.

Established in 1911.

Character of Drainage Basin: Mountains at the head, irrigated valley below.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	115	55	62.7	3,860
November	78	55	64.3	3,830
December	55	55	55	3,380
January	53	43	49.1	3,020
February a	80	.....	44.6	2,480
March	164	43	65.9	4,050
April	99	43	69.5	4,140
May	179	65	120	7,380
June	355	110	207	12,300
July	127	49	85.2	5,240
August	80	35	45.1	2,770
September	99	35	52.1	3,100
The year	355	.....	76.8	55,600
Monthly Flow for Year ending Sept. 30, 1915				
October (Est.)	.....	.....	105	6,460
November	179	72	101	6,010
December 1-15	80	43	55.5	1,650
March 22-31	110	65	79.5	1,580
April	410	53	153	9,100
May b	301	150	209	12,900
June	357	139	206	12,300
July	397	139	187	11,500
August	123	42	72.1	4,430
September	70	50	62.1	3,700

a Estimated, Feb. 5 to 24.

b Estimated, May 1 to 9.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## MISSION CREEK.

Observation Station Located in S. W. ¼ Sec. 10, T. 18 N., R. 20 W., One Mile Below St. Ignatius, Montana.

Established 1906.

Drainage Area, 58 square miles.

Character of Drainage Basin: Mountains and rolling irrigated valley.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	38	29	30.3	1,860
November	29	22	25.8	1,540
December	22	10	15.8	972
January	16	11	15.7	965
February	16	11	12.7	705
March	14	11	11.9	732
April	22	11	15.4	916
May	201	26	91.4	5,620
June	358	132	209	12,400
July	226	68	137	8,420
August	61	29	37.8	2,320
September	38	16	33.2	1,980
The year	358	10	53.2	39,400
Monthly Flow for Year ending Sept. 30, 1915				
October	76	38	52.0	3,200
November	61	29	36.8	2,190
December	29	22	26.4	1,620
March 16-31	16	16	16.0	508
April	111	19	55.8	3,370
May	178	61	120	7,380
June	385	201	246	14,600
July	358	252	295	18,100
August	213	132	167	10,300
September	111	38	61.1	3,640

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## DRY CREEK.

Observation Station Located Five Miles Southeast of St. Ignatius, Montana.

Established in 1908.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in Acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
April .....	10	0	2.39	142
May .....	202	4	33.7	2,070
June .....	150	25	66.0	3,930
July .....	101	14	39.6	2,430
August .....	14	7	9.48	583
September .....	7	3	4.93	293
Total recorded .....				9,450
Monthly Flow for Year ending Sept. 30, 1915				
October .....	38	3.0	15.6	959
November .....	10	6.0	7.87	468
December 1-12 .....	6	2.0	4.17	99.3
March 20-31 .....	6	.5	3.66	87.1
April .....	44	4.0	20.3	1,210
May .....	49	16	36.9	2,270
June .....	113	34	62.8	3,740
July .....	86	47	66.1	4,060
August .....	54	16	25.8	1,590
September .....	20	14	16.1	958

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## POST CREEK.

Observation Station Located at Highway Bridge on Line Between Secs. 23 and 24, T. 19 N., R. 20 W., Near Ronan, Montana.

Established in 1911.

Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	49	31	40.6	2,500
November .....	56	46	49.3	2,930
December .....	46	43	43.8	2,690
January .....	59	40	43.1	2,650
February .....	110	32	42.2	2,340
March .....	62	25	41.3	2,540
April .....	48	25	32.8	1,950
May .....	311	28	125	7,690
June .....	431	125	244	14,500
July .....	248	62	180	11,100
August .....	57	22	32.2	1,980
September .....	44	20	25.7	1,510
The year .....	431	20	75.1	54,100
Monthly Flow for Year ending Sept. 30, 1915				
October .....	93	22	39.5	2,640
November .....	86	44	71.0	4,270
December 1-15 .....	66	40	53.1	1,580
April .....	142	51	89.5	5,330
May .....	431	89	189	11,600
June .....	377	170	228	13,600
July .....	286	180	222	13,700
August .....	170	95	132	8,170
September .....	134	72	85.1	5,060

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## SOUTH FORK OF JOCKO RIVER.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 35, T. 17 N., R. 18 W., Near Jocko, Mont.  
Established in 1912.  
Character of Drainage Basin: Timbered mountains.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	.....	.....	58.3	3,580
November 1-15 .....	.....	.....	42.0	1,250
April .....	131	35	70.1	4,170
May .....	415	124	292	18,000
June .....	368	172	271	16,100
July .....	171	76	124	7,620
August .....	74	48	59.0	3,630
September .....	61	41	50.6	3,010
Monthly Flow for Year ending Sept. 30, 1915				
October .....	164	52	116	7,130
November a .....	98	.....	50.1	2,980
April .....	176	55	125	7,440
May .....	251	137	198	12,200
June .....	251	172	214	12,700
July .....	167	106	138	8,480
August .....	105	65	84.1	5,170
September .....	78	53	64.3	3,830

a Estimated, Nov. 22- 30.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## JOCKO RIVER.

Observation Station Located in T. 16 N., R. 19 W.,  $\frac{1}{4}$  Miles Northwest of Jocko, Mont.  
Established in 1908.  
Drainage Area, 122 square miles.  
Character of Drainage Basin: Mostly mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	162	125	137	8,420
November .....	152	108	137	8,150
December 1-12 .....	.....	.....	83.9	2,000
April .....	355	78	241	14,300
May .....	762	323	608	37,400
June .....	935	298	493	29,300
July .....	282	53	134	8,240
August .....	113	53	89.7	5,520
September .....	104	81	87.7	5,220
Monthly Flow for Year ending Sept. 30, 1915				
October a .....	.....	95	189	11,600
March 26-31 .....	131	119	125	1,490
April .....	550	134	317	18,900
May .....	570	347	485	29,800
June .....	625	368	499	29,700
July .....	380	223	308	18,900
August .....	211	142	154	9,470
September .....	173	122	160	9,520

a Estimated, October 21-31.

Reference for Daily Flow in U. S. G. S. Water Supply Papers 392 and 412.

## MIDDLE FORK OF JOCKO RIVER.

Observation Station Located Near North Line of Sec. 35, T. 17 N., R. 18 W., Near Jocko, Montana.

Established in 1912.

Character of Basin: Timbered mountains.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	22	13	16.9	1,040
November	13	10	11.4	678
December 1-13	9	8	8.7	224
April	29	13	19.7	1,170
May	71	28	52.0	3,200
June	58	36	43.9	2,610
July	35	28	30.8	1,890
August	28	20	23.8	1,460
September	20	17	18.4	1,090
Monthly Flow for Year ending Sept. 30, 1915				
October	47	18	32.7	2,010
November	25	10	14.9	887
December 1-12	10	9	9.7	231
April	47	18	32.8	1,950
May	45	31	37.3	2,290
June	39	35	36.5	2,170
July	38	30	34.1	2,100
August	30	20	23.6	1,456
September	24	18	21.6	1,290

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## FALLS CREEK.

Observation Station Located in N. E. ¼ Sec. 22, T. 17 N., R. 18 W., Near Jocko, Mont.

Established in 1912.

Character of Drainage Basin: Heavily timbered mountains.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	4.2	2.8	3.13	192
November	2.8	1.0	2.02	120
December 1-6	.....	.....	1.00	11.9
April	10.2	2.6	5.68	338
May	83	9.9	49.0	3,010
June	57	19	31.7	1,890
July	18	5.6	11.4	701
August	5.5	2.4	3.87	238
September	11.5	2.1	4.50	268
Monthly Flow for Year ending Sept. 30, 1915				
October	31	4.8	16.0	984
November	9.8	3.8	6.19	368
December 1-12	3.8	1.5	2.99	71.2
March 26-31	4.9	3.9	4.40	52.4
April	58	3.8	29.5	1,760
May	60	18	46.8	2,880
June	58	25	41.9	2,490
July	29	13	21.4	1,320
August	14	3.4	6.79	418
September	16	4.0	10.8	643

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## SEVENTH BIENNIAL REPORT OF THE STATE ENGINEER

## NORTH FORK OF JOCKO RIVER.

Observation Station Located in N. W.  $\frac{1}{4}$  Sec. 23, T. 17 N., R. 18 W., Near Jocko, Mont.  
Established in 1912.  
Character of Drainage Basin: Timbered, mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	15	12	13.0	779
November	12	7	9.30	553
December 1-13	7	6	6.69	172
April	92	21	47.8	2,840
May	383	87	252	15,500
June	295	85	162	9,640
July	83	20	54.6	3,360
August	19	9.5	13.8	848
September	26	8.0	13.2	785
Monthly Flow for Year ending Sept. 30, 1915				
October	103	16	61.5	3,780
November	60	17	29.1	1,730
December 1-12	17	15	15.8	376
March 26-31	31	31	31.0	369
April	198	31	114	6,780
May	187	92	159	9,780
June	177	96	123	7,320
July	96	40	71.0	4,370
August	39	18	24.5	1,510
September	31	20	25.8	1,540

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## BIG KNIFE CREEK.

Observation Station Located in T. 17 N., R. 19 W.,  $2\frac{1}{2}$  Miles Northeast of Jocko, Mont.  
Established in 1908.  
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	12	9.4	10.2	627
November	9.4	7.3	8.40	500
December 1-12	7.1	5.8	6.38	152
April	5.9	4.6	5.46	325
May	26	6.0	16.1	990
June	33	21	26.7	1,590
July	23	14.2	17.6	1,080
August	14.1	10.2	11.8	726
September	12.2	9.5	10.5	625
Monthly Flow for Year ending Sept. 30, 1915				
October a	14.8	.....	10.5	646
May 24-31	34	30	31.2	495
June	34	27	31.0	1,840
July	28	20	24.7	1,520
August	20	13	16.5	1,010
September	14	11	12.5	744

a Estimated, October 21-31.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## AGENCY CREEK.

Observation Station Located in T. 16 N., R. 19 W., Two Miles East of Jocko, Montana.  
 Established in 1908.  
 Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	6.9	4.6	5.57	342
November .....	6.1	2.1	3.87	230
December 1-12 .....	2.1	2.0	2.05	48.8
April .....	8.9	2.8	5.90	351
May .....	70	9.0	42.8	2,630
June .....	55	29	39.2	2,330
July .....	28	9.6	17.8	1,090
August .....	9.4	5.5	7.36	453
September .....	7.2	4.8	5.70	339
Monthly Flow for Year ending Sept. 30, 1915				
October 1-20 .....	10.6	5.6	8.37	332
June .....	50	30	37.2	2,210
July .....	46	17.5	29.7	1,830
August .....	18.2	7.0	11.8	726
September .....	31.0	7.3	10.6	631

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## FINLEY CREEK.

Observation Station Located in Sec. 31, T. 16 N., R. 19 W., Four Miles Southwest of Jocko, Montana.

Established in 1908.  
 Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	12	5.8	9.04	556
November .....	8.7	6.3	7.34	437
December 1-12 .....	6.3	4.5	5.57	133
April .....	28	9.6	20.2	1,200
May .....	87	28	69.5	4,270
June .....	100	43	66.6	3,960
July .....	41	9.3	21.7	1,330
August .....	9.3	6.2	8.54	525
September .....	7.1	5.8	6.22	370
Monthly Flow for Year ending Sept. 30, 1915				
October 1-20 .....	14.8	6.0	9.79	388
May 24-31 .....	91	82	85.0	1,350
June .....	95	42	73.4	4,370
July .....	61	23	38.1	2,340
August .....	24	7.8	14.7	904
September .....	14	7.4	9.53	567

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## EAST FINLEY CREEK.

Observation Station Located in T. 18 N., R. 18 W., Four Miles South of Jocko, Montana.  
Established in 1908.  
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	11	4.6	7.11	437
November	9.3	5.5	6.60	393
December 1-12	5.5	4.5	5.04	120
April	10.4	2.8	6.56	390
May	55	10.6	39.6	2,430
June	50	23	34.8	2,070
July	25	7.1	13.6	836
August	7.0	4.7	5.79	356
September	7.3	4.2	5.53	329
Monthly Flow for Year ending Sept. 30, 1915				
October a	16	.....	9.06	557
May 24-31	71	45	54.1	858
June	71	24	47.0	2,800
July	55	17	28.5	1,750
August	16	7.0	10.5	646
September	14	7.6	9.14	544

a Estimated, October 25-31.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## INDIAN DITCH.

Observation Station Located Near S. Line Sec. 32, T. 16 N., R. 19 W., Four Miles South of Jocko, Montana.  
Established in 1908.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October	7.5	3.5	5.92	364
November	6.9	3.6	5.50	327
December 1-12	3.6	2.2	2.84	68
April	9.5	2.2	5.95	354
May	25	5.5	16.1	990
June	16	5.9	11.2	666
July	11	4.8	7.76	477
August	5.3	3.9	4.90	301
September	8.5	3.9	6.23	371
Monthly Flow for Year ending Sept. 30, 1915				
October a	9.8	.....	7.64	470
June	11.5	0.7	5.54	330
July	13.8	2.8	7.02	432
August	9.4	1.9	5.35	329
September	10.6	5.0	6.96	414

a Estimated, October 21-31.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## REVAIS CREEK.

Observation Station Located in T. 18 N., R. 22 W., Four Miles West of Dixon, Montana.  
Established in 1911.  
Character of Drainage Basin: Mountainous.

Month.	Discharge in Second-feet			Run-off
	Maximum	Minimum	Mean.	Total in acre-feet
Monthly Flow for Year ending Sept. 30, 1914				
October .....	12	7	8.3	510
November .....	16	9.5	12.2	726
December .....	11	7	7.8	480
January .....	8	6	6.5	400
February .....	8	6	6.5	361
March .....	11	6	8.5	523
April .....	97	8	42.6	2,530
May .....	202	50	118	7,260
June .....	177	29	65.5	3,900
July .....	29	11	17.1	1,050
August .....	11	6	7.5	461
September .....	8	6	6.5	387
The year .....	202	6	25.6	18,600
Monthly Flow for Year ending Sept. 30, 1915				
October .....	14	6.0	9.8	603
November .....	18	11.0	15.6	928
December 1-12 .....	14	8.0	10.0	238
March 14-31 .....	12.5	6.0	9.06	323
April .....	74	11.9	38.9	2,310
May .....	139	26.0	74.8	4,600
June .....	61	23.0	42.3	2,520
July .....	26	11.0	19.9	1,220
August .....	16	8.0	10.6	652
September .....	12.5	7.0	8.86	527

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## THOMPSON RIVER.

Observation Station Located in S. E.  $\frac{1}{4}$  Sec. 7, T. 21 N., R. 28 W., About Eight Miles East of Thompson Falls, Montana.

Established in 1911.

Drainage Area, about 600 square miles.

Character of Drainage Basin: Mountainous and forested.

There were only a few gage heights recorded at irregular intervals during 1914 and 1915, from which the following discharges were determined:

1914: Oct. 7, 162 second-feet.

1915: March 20, 206 second-feet; April 3, 350 second-feet; April 8, 407 second-feet; April 17, 370 second-feet; June 9, 437 second-feet; June 12, 467 second-feet; June 23, 183 second-feet; June 28, 350 second-feet; July 30, 254 second-feet; Aug. 7, 206 second-feet; Aug. 13, 22, 29, Sept. 3, 14 and 16, 162 second feet; and Sept. 21, 206 second-feet.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 392 and 412.

## PROSPECT CREEK.

Observation Station Located in N. E.  $\frac{1}{4}$  Sec. 18, T. 21 N., R. 29 W., About One Mile from Thompson Falls, Montana.

Drainage Area, 139 square miles.

Character of Drainage Basin: Mountainous and forested.

Gage heights were read on only a few days of 1914 and 1915, the discharges for which may be found in U. S. G. S. Water Supply papers Nos. 392 and 412.

## MISCELLANEOUS DISCHARGE MEASUREMENTS IN CLARK FORK OF COLUMBIA RIVER DRAINAGE BASIN DURING THE TWO YEARS ENDING SEPTEMBER 30, 1915.

Date	Stream	Tributary to	Locality	Discharge Sec. Ft.
1914 May 27	Rock Creek.....	Bitterroot River.....	Near Como .....	704

## ST. MARY RIVER DRAINAGE BASIN

### ST. MARY RIVER NEAR BABB, MONT

Observation Station Located About Two Miles South of Babb, Montana.

Established in 1902.

Elevation of Station, 4,500 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 177 square miles.

Character of Drainage Basin: Forested mountains; the stream is fed by numerous glaciers.

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	232	203	222	1.25	1.44	13,700
November	232	176	207	1.17	1.30	12,300
December			115	.650	.75	7,070
January	67	48	61.1	.345	.40	3,760
February	90	64	75.8	.428	.45	4,210
March	99	90	94.2	.532	.61	5,790
April	590	108	232	1.31	1.46	13,800
May	1,600	590	1,170	6.61	7.62	71,900
June	1,760	935	1,280	7.23	8.07	76,200
July	1,200	490	874	4.94	5.70	53,700
August	540	367	436	2.46	2.84	26,800
September	445	248	321	1.81	2.02	19,100
The year	1,760		426	2.41	32.66	308,000
Monthly Flow for Year ending Sept. 30, 1915						
October	540	349	433	2.45	2.82	26,600
November	515	218	395	2.23	2.49	23,500
December	215	111	173	.977	1.13	10,600
January	114	59	81.0	.458	.53	4,980
February	83	64	72.7	.411	.43	4,040
March	72	55	59.7	.337	.39	3,670
April	524	76	243	1.37	1.53	14,500
May	1,110	600	854	4.82	5.66	52,500
June	1,260	854	1,060	5.99	6.68	63,100
July	1,330	653	911	5.15	5.94	56,000
August	680	408	557	3.15	3.63	34,200
September	574	304	405	2.29	2.56	24,100
The year	1,330	55	439	2.48	33.69	318,000

a Estimated, Dec. 1-19, by comparison with lower station.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 385 and 405.

### ST. MARY RIVER BELOW SWIFTCURRENT CREEK.

Observation Station Located at Babb, Mont.

Established in 1901.

Elevation of Station, 4,400 feet.

Elevation of Head Waters, 8,000 feet.

Drainage Area, 298 square miles.

Character of Drainage Basin: Forested mountains; stream fed by glaciers.

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	355	226	277	0.930	1.07	17,000
November	345	240	289	.970	1.08	17,200
December	300	30	164	.550	.63	10,100
January			90	.302	.35	5,530
February			110	.369	.38	6,110
March	185	132	138	.463	.53	8,480
April	994	150	484	1.62	1.81	28,800
May	2,470	980	1,900	6.38	7.36	117,000
June	2,400	1,480	1,950	6.54	7.30	116,000
July	1,780	894	1,310	4.40	5.07	80,600
August	764	462	639	2.14	2.47	39,300
September	718	373	527	1.77	1.98	31,400
The year	2,470		659	2.21	30.03	478,000

## ST. MARY RIVER BELOW SWIFTCURRENT CREEK.—Cont.

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in Inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1915						
October	1,130	630	800	2.68	3.09	49,200
November	974	340	629	2.11	2.35	37,400
December	340	150	222	.745	.86	13,600
January	202	115	134	.450	.52	8,240
February	132	90	98.6	.331	.34	5,480
March	122	90	103	.346	.40	6,330
April	1,170	122	508	1.70	1.90	30,200
May	1,860	922	1,380	4.63	5.34	84,800
June	1,900	1,200	1,570	5.27	5.88	93,400
July	1,790	918	1,260	4.23	4.88	77,500
August	955	655	788	2.64	3.04	48,500
September	988	520	667	2.24	2.50	39,700
The year	1,900	90	682	2.29	31.10	494,000

a Estimated.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 385 and 405.

## ST. MARY RIVER.

Observation Station Located at Kimball, Alberta.

Established in 1913.

Drainage Area, 472 square miles.

Character of Drainage Basin: Mountains and prairies.

Month.	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in Inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	576	364	448	0.949	1.09	27,546
November	416	266	371	.786	.88	22,076
December	312	78	190	.403	.46	11,683
January	215	77	128	.271	.31	7,870
February	130	70	101	.214	.22	5,609
March	248	98	184	.390	.45	11,314
April	1,129	265	637	1.350	1.51	37,904
May	2,834	1,092	2,230	4.725	5.45	137,120
June	3,120	1,742	2,331	4.939	5.51	138,700
July	1,989	840	1,430	3.030	3.49	87,927
August	840	543	719	1.523	1.76	44,210
September	818	410	584	1.237	1.38	34,750
The year	3,120	70	783	1,659	22.51	567,000
Monthly Flow for Year ending Sept. 30, 1915						
October	1,255	671	841	1.782	2.05	51,711
November	1,012	375	702	1.488	1.66	41,772
December	367	183	256	.542	.62	15,741
January	186	149	168	.356	.41	10,330
February	148	93	117	.248	.26	6,498
March	265	108	157	.333	.38	9,654
April	920	217	578	1.22	1.36	34,393
May	2,246	1,220	1,646	3.49	4.02	101,210
June	2,794	1,280	2,213	4.69	5.23	131,680
July	2,542	1,220	1,720	3.64	4.20	105,760
August	1,410	750	1,010	2.14	2.47	62,100
September	1,910	668	928	1.97	2.20	55,200
The year	2,794	93	861	1.824	24.86	626,000

Note: The figures for 1915 are provisional and are subject to revision.

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 385 and 405.

## SWIFTCURRENT CREEK AT McDERMOTT LAKE.

Observation Station Located at Outlet of Lake in Sec. 12, T. 35 N., R. 16 W., Near Babb, Montana.

Established in 1912.  
Elevation of Station, 4,860 feet.  
Elevation of Head Waters, 7,500 feet.  
Drainage Area, 31.4 square miles.  
Character of Drainage Basin: Mountainous; fed by glaciers.

Month	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in Inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	127	76	97.6	3.11	3.58	6,000
November	94	62	71.8	2.29	2.56	4,270
December	68	49	55.6	1.77	2.04	3,420
April	225	84	133	4.24	4.73	7,910
May	580	178	368	11.7	13.49	22,600
June	680	155	360	11.5	12.83	21,400
Monthly Flow for Year ending Sept. 30, 1915						
April 25-30	314	183	246	7.83	1.75	2,930
May	600	183	314	10.0	11.53	19,300
June	502	183	346	11.0	12.27	20,600
July	406	138	224	7.13	8.22	13,800
August	183	114	153	4.87	5.62	9,410
September	245	76	125	3.98	4.44	7,440
The period						73,400

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 385 and 405.

## SWIFTCURRENT CREEK AT SHERBURNE, MONT.

Observation Station Located at Outlet of Lower Sherburne Lake, in Sec. 35, T. 36 N., R. 15 W.

Established in 1912.  
Elevation of Station, 4,726 feet.  
Elevation of Head Waters, 7,500 feet.  
Drainage Area, 64 square miles.  
Character of Drainage Basin: Mountainous; stream fed by glaciers.

Month	Discharge in second-feet.				Run-off.	
	Max.	Min.	Mean.	Per square mile	Depth in Inches	Total acre-feet
Monthly Flow for Year ending Sept. 30, 1914						
October	222	84	133	2.08	2.40	8,180
November	128	64	91.4	1.43	1.60	5,440
December	66	61	61.7	.966	1.11	3,790
April 18-30	366	202	291	4.55	2.20	7,500
May	930	222	599	9.36	10.79	36,800
June	1,090	222	525	8.20	9.15	31,200
July	672	174	334	5.22	6.02	20,500
August	222	132	162	2.53	2.92	9,960
September			126	1.97	2.20	7,500
Monthly Flow for Year ending Sept. 30, 1915						
November 9-16	288	276	282	4.41	1.31	4,470
April 24-30	300	210	244	3.81	.99	3,390
May	773	140	402	6.30	7.26	24,700
June	816	231	473	7.40	8.26	28,100
July	525	200	316	4.94	5.70	19,400
August	264	140	203	3.17	3.66	12,500
September	325	90	173	2.70	3.01	10,300

Reference for Daily Flow in U. S. G. S. Water Supply papers Nos. 385 and 405.

## INDEX TO STREAM—FLOW DATA IN REPORTS OF THE U. S. GEOLOGICAL SURVEY

Prior to 1902 the results of stream measurements were not published by drainage basins, giving complete annual results for each basin in one paper, but appeared in various reports, as shown in the following table:

(Ann.—Annual Report; B.—Bulletin; W. S.—Water Supply Paper.)

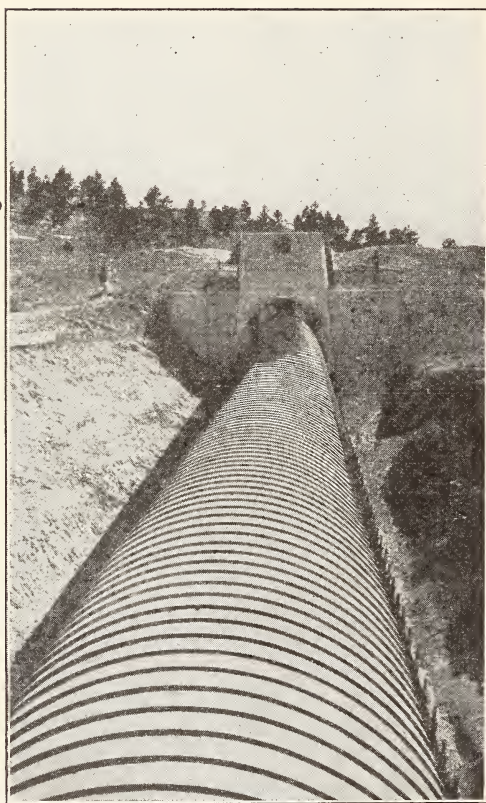
Report.	Character of Data.	Year
10th Ann., pt. 2.....	Descriptive information only .....	
11th Ann., pt. 2.....	Monthly discharge .....	1884 to Sept., 1890.
12th Ann., pt. 2.....	do .....	1884 to June 30, 1891.
13th Ann., pt. 3.....	Mean discharge in second-foot .....	1884 to Dec. 31, 1892
14th Ann., pt. 2.....	Monthly discharge (long-time records, 1871 to 1893) .....	1888 to Dec. 31, 1893
B. 131 .....	Description, measurements, gage heights, and ratings .....	1893 and 1894.
16th Ann., pt. 2.....	Descriptive information only .....	
B. 140 .....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years) .....	1895.
W. S. 11 .....	Gage heights (also gage heights for earlier years) .....	1896.
18th Ann., pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years) .....	1895 and 1896.
W. S. 15 .....	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas .....	1897.
W. S. 16 .....	Description, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte and western United States .....	1897.
19th Ann., pt. 4.....	Description, measurements, ratings and monthly discharge (also some long-time records) .....	1897.
W. S. 27 .....	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River .....	1898.
W. S. 28 .....	Measurements, ratings, and gage heights, Arkansas River and western United States .....	1898.
20th Ann., pt. 4.....	Monthly discharge also for many earlier years) .....	1898.
W. S. 35 to 39 .....	Descriptions, measurements, gage heights, ratings .....	1899.
21st Ann., pt. 4.....	Monthly discharge .....	1899.
W. S. 47 to 52 .....	Descriptions, measurements, gage heights, and ratings .....	1900.
22nd Ann., pt. 4.....	Monthly discharge .....	1900.
W. S. 65, 66 .....	Descriptions, measurements, gage heights and ratings .....	1901.
W. S. 75 .....	Monthly discharge .....	1901.

After 1901 the data has been published in Water Supply Papers according to drainage basins as shown in the following list for the drainage basins which include parts of Montana.

Year.	Numbers of Water Supply Papers.		
	Missouri River Drainage	Columbia River Drainage	Hudson Bay Drainage
1902 .....	84	85	85
1903 .....	99	100	100
1904 .....	130	135	130
1905 .....	172	178	171
1906 .....	208	214	207
1907-8 .....	246	252	245
1909 .....	266	272	265
1910 .....	286	292	285
1911 .....	306	312	305
1912 .....	326	332	325
1913 .....	356	362a	355
1914 .....	386	392	385
1915 .....	406	412	405

Note.—Missouri River drainage includes Missouri River, Yellowstone River and Little Missouri River. Columbia River drainage includes Clark Fork of Columbia River and Kootenai River. Hudson Bay drainage includes St. Mary River.

Water Supply Paper 119 contains an index of records prior to 1904.



Intake End of Siphon Replacing Alkali Creek  
Flume, Billings "Carey" Project.

REPORT  
—OF THE—  
CAREY LAND ACT BOARD  
—OF THE—  
STATE OF MONTANA  
—FOR THE—  
YEARS 1915-1916

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A. W. MAHON, State Engineer, Secretary

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The Carey Land Act Board, during the past two years, has been composed of Governor S. V. Stewart, Chairman; Secretary of State A. M. Alderson; and during the forepart of 1915 by former Attorney General D. M. Kelly, and for the balance of the term, by his successor, Judge J. B. Poindexter. A. W. Mahon, State Engineer, is the ex-officio Secretary and supervising engineer of the Board and G. R. Davies as assistant secretary.

The Carey Land Act Board continues to be self-supporting and the projects built and land reclaimed under its supervision, have added to the taxable wealth of the state without being an expense to it, to say nothing of the prosperous communities it has been instrumental in building up in different localities.

The tendency to doubt the water supply of Carey projects in this State seems to be more or less dispelled since the stand Montana has taken and the safeguards the State Engineer has been placing about every project in demanding a showing of water supply by the company, and actual measurements and investigations being made by his office. Measuring stations have been established to keep a continuous record of the flow of all streams furnishing the principal supply for the several projects and the companies are plainly advised that the state will not permit the sale of more land under their irrigation system than the amount of water shown by the records we are keeping of the streams will reclaim. Further, that before accepting their work or water supply, the hydrographer of the State Engineer's office will report upon the capacities of their canal systems from actual current meter measurements taken on the system in actual service and their capacities must be shown to be sufficient for the amount of water proposed to be used and the amount of land proposed to be reclaimed.

While the sale of Carey lands during the past two years has been slow, during the past few months it has started to move in a very substantial manner and a general tone of confidence now seems to be manifesting itself as to Montana Carey Lands.

We herewith give statement of the several projects as submitted to this office as of date October 31st, 1916, with such additional facts as we deem of sufficient interest for publication:

### BILLINGS PROJECT.

Within this project there are 13,834.63 acres of Carey Act land, of which 10,192.88 acres have been sold. Very little of this was sold during the past two years, the total being only 240 acres. The total amount received by the Board for this 240 acres and the filing fees therefor, was \$504.00

The total acreage in this project patented to the state is 13,223.54 acres; and of this the state has patented to settlers 7,435.67 acres.

This project is known locally as the "Billings Bench," and lies principally northeast of the City of Billings. It has experienced the stormy career of most Carey projects but has always been able to weather the storms and may confidently be classed as a successful one.

For the purpose of financing the requirements of the State as to canal capacities and improvements with the backing of its creditors, the Billings Land & Irrigation Company placed its affairs in the custody of the Merchants' Loan Company of Billings as trustee. This trustee arranged with the settlers to maintain, operate and improve the canal as required by the State, and the settlers, as a corporation, entered into a contract with the said trustee under date of October 28th, 1915, for that purpose. The work has seemingly been progressing satisfactorily under this arrangement, though the contract cannot be officially recognized by the Carey Board until the system is in such shape that they can accept it as a completed project and until that time the State holds the Billings Land & Irrigation Company and its bondsmen responsible for the faithful fulfilment of their contract.

Measurements of the water running through the company's canals have been regularly made by the State Engineer's office, together with careful estimates of capacities and losses upon which to base a final acceptance of the project as a whole when our requirements have been complied with to protect future settlers.

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### Statement of Billings Land & Irrigation Company To October 31st, 1916.

Carey Land Act Board,  
Helena, Montana.

Gentlemen:

We can report considerable progress on the Billings Bench project since your last published report.

Approximately \$70,000.00 has been expended during the past four-

teen months, the larger portion of this being spent in permanent improvements and betterments of the system. \* \* \* \* \*

This project is going ahead in actual development and at this time compares very favorably with the older project west of Billings.

Yours very truly,

Merchants' Loan Company, Trustee.

By Elroy H. Westbrook.

#### ITEMIZED DESCRIPTIVE STATEMENT BY THE COMPANY.

Name of Project: Billings Bench.

Name of Company: Billings Land & Irrigation Company.

Post Office Address: Billings, Montana.

County in which lands are situated: Yellowstone.

##### Description of Location:

Altitude: 3,000 feet.

Topography: Bench land, crossed by 5 creeks, generally smooth, sloping North and East.

Soil: Sandy loam and clay loam.

##### Description of Water Supply:

Stream or streams from which water supply is obtained: Yellowstone River.

Whether running water, flood water, or both: Running.

Number of Reservoirs with area and capacity of each: One is projected: Area 215.73 acres, capacity 1700 acre feet.

Water otherwise appropriated on stream: Supply is so large that other appropriations need not be considered.

Canal leading from stream to land or reservoir:

Length, 61 miles.

Capacity at head, 360 cu. ft. per second.

Length of main laterals completed: 97 miles.

Length of main lateral to be built: 3 miles.

Length of distributing lateral completed: Included in main laterals.

Length of distributing laterals to be built: Included in main laterals.

Total length of canals and laterals completed: 158 miles.

Total length of canals and laterals to be completed: 3 miles.

##### General Description of Project:

Gravity system, following contour of valley on uniform grade.

Number and character of structures: Concrete headgate, 8 flumes, wood, aggregating 1900 feet, 3 wooden stave iron banded pipe syphons, about 2850 feet.

Engineering Difficulties: One tunnel 1847 feet long through solid rock and about 4000 feet rock cut. It has been necessary to timber about 500 feet of the tunnel. A large flume carrying water over Alkali creek was replaced in 1916 by syphon 96 inches in diameter carried over Alkali creek on steel bridge.

Total estimated cost of project: \$450,000.00.

Total expenditures to Oct. 31, 1916: \$496,698.77.

Price of water right per acre for Carey Act Lands: About \$53.00.

Price of water right per acre for lands owned by the Company: Price of land and water right from \$50 to \$65 an acre.

Price of water right per acre for other than Company and Carey Act Lands: From \$30.00 to \$35.00 an acre.

Terms of payment on water contracts: One-fourth cash, balance, ten annual payments.

Total number of acres within boundaries of project. 34,000.

Total number of acres susceptible of irrigation for

Carey: 11,000

Company Deeded: 11,000

Private: 3,000

State: 1,000

Total number of acres to be actually irrigated by project: 26,000.

What necessities for drainage system have arisen: A few cases of seepage from canal and excess irrigation in localities where there is shale formation.

What character of drainage has been adopted and to what extent in actual construction: Two complete sub-surface drains (box) have been completed, one 13,500 ft. long and one 12,000 ft. long. These built under two drainage districts, supervised by the County Drain Commissioner.

Number of acres of Carey land filed on: 10,905.13.

Number of acres of Carey land filed on susceptible to irrigation: 9,239.40.

Number of acres of Carey land open to entry: 2,968.46.  
Number of acres of Carey land open to entry susceptible to irrigation: 1,790.00.  
Amount of water per acre required to be furnished by Carey Board: One cubic foot per 100 acres per second.  
Amount of water per acre actually required by land: Varies according to kind of crops, but not in excess of amount required to be furnished.  
Method of measuring water to farm units: By weirs and turn-out boxes.  
Method of record of water delivery: Patrolmen required to take daily measurements of water delivered from about June 15 to Aug. 15.  
Amount charged per acre for maintenance as per contract with Carey Board: \$1.00 per acre.  
Actual cost of maintenance per acre: \$1.35 per acre.

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### BIG TIMBER PROJECT.

The lands embraced in this project lie near Big Timber and the Contracting Company is the Glass-Lindsay Land Company. The total area of Carey Act Land within the project is 11,299.16 acres; total sales of Carey Act Land is 5,014.94 acres. The total area patented to the State is 7,356.12 acres, and the total area patented by the State to settlers is 3,299.32 acres.

Very little land movement has taken place on this project during the past two years, only 120 acres having been sold, making the receipts from this project for land and filing fees only \$61.00.

This project is nearly complete and the State Engineer has had an extensive examination of the water supply made during the past year preliminary to the measurement of capacities of the canals for the land to be served.

The itemized statement of the Company of two years ago will cover the present conditions.

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### VALIER PROJECT.

The Valier Project is the largest Carey Land project in the state and is quite generally described in the company's report given below. It has within its boundaries 85,540.14 acres of Carey Act Land, of which a total area of 35,150.91 acres have been sold. Of these sales, 4,545.64 acres were disposed of during the last two fiscal years, from which the Board received \$5,100.42.

The State has applied for patent to 35,000 acres in this project and the application is now pending.

During the past two years the Birch Creek reservoir has been brought into use and the new "Swift" dam, the highest rock-fill dam of which we can get any record, has been subjected to record-breaking floods and has satisfactorily withstood the test. The wasteway, however, developed a weak point in design which the engineer of the Company has agreed to promptly rectify by enlarging the channel of the wasteway into which the spillway discharges.

Measurements of water supply are being carefully taken and worked out on this project and a number of automatic gauges have been installed, which are checked up periodically by the Hydrographer of the State Engineer's office. An exhaustive report on the prior rights entering into

the consideration of the actual water supply to which this project has a right, has been called for by the State Engineer for the purpose of ascertaining the water supply available for Carey Act Lands. This report is just at hand and is based upon an actual hydrographic survey of the valleys from which water is being diverted.

**Statement of the Valier Project to October 31st, 1916.**

Carey Land Act Board,  
Helena, Montana.

Gentlemen:

The past year has been one of progress and prosperity for the Valier Project, and has done wonders in changing the entire Valier country from its experimental stage into a rapidly developing "Permanent Farming Community." \* \* \* \* \*

One of the most important features of our 1916 sales, is the fact that we have sold almost seven thousand acres of land to local farmers already interested here, who are increasing their holdings.

Yours very truly,

R. W. SPEIR, Assistant Manager.

**ITEMIZED DESCRIPTIVE STATEMENT OF THE COMPANY.**

Name of Project: The Valier Project.

Name of Company: The Valier-Montana Land & Water Company.

Post Office Address: Valier, Montana.

County in which lands are located: Teton County.

Description of location:

The Valier Project is located near the northern boundary of the state. It extends two townships north, two townships south, three townships west, and four townships east of Valier, Montana.

Altitude:

The irrigable land lies between elevations 3400 and 3900, U. S. G. S. datum.



Birch Creek Reservoir During Flood, Showing Wasteway and The "Swift" Dam, the Highest Rock-Fill Dam Known—Valier "Carey" Project.

**Topography:**

The tract lies in a gently rolling, prairie-like country, clear of brush and trees. The land drains in a north-easterly direction, with a slope of fifty feet per mile to the Marias River.

**Soil:**

The soil is deep beyond all practical requirements. It is very fertile, and its description is as follows: In the eastern part of the project, it ranges from a heavy sandy loam in the north to a fine sandy loam in the south; in the central part it ranges from a heavy sandy loam in the north to a light clay loam in the south; in the western part it ranges from a heavy clay loam in the north and south to a gravelly soil in the extreme southwest corner.

**Description of Water Supply:**

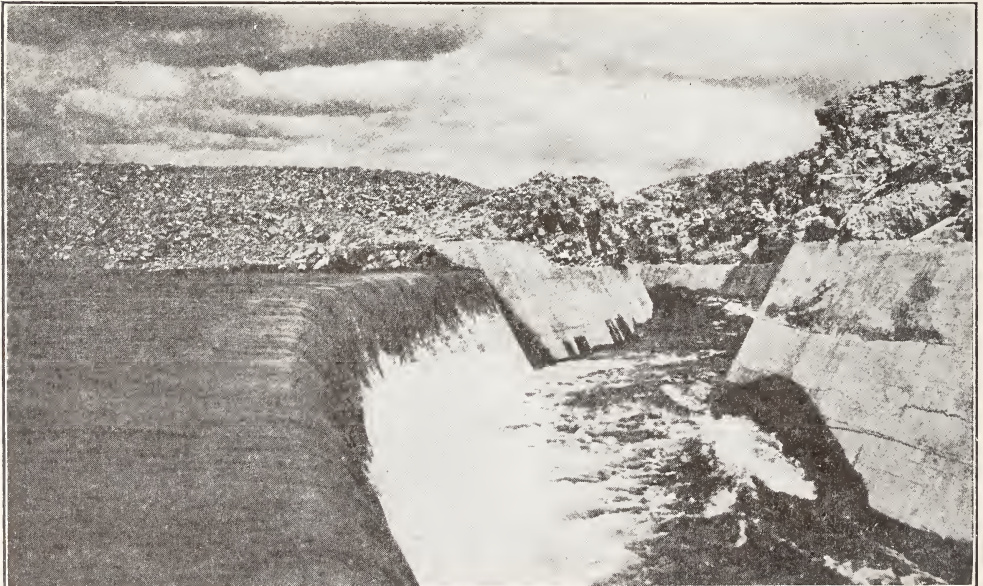
The main portion of the water supply is derived from Birch Creek, a mountain stream flowing the year round and from the east slope of the Rockies. The water is of excellent quality. This creek drains an area of 150 square miles above the intake works of the Birch Creek Canal. The stream records at a point one-half mile above this intake, which have been kept since 1907 to date, indicate that all the years with the exception of 1910 and 1914 have been wet years. The records further show that the season's flow of this stream is not sufficient to take care of the project by direct flow. The Birch Creek Canyon Reservoir was consequently adopted as being necessary. The Swift Dam impounding these waters is now completed. The flow from Birch Creek is supplemented by the flow of Dupuyer Creek, which has a drainage area of 111 square miles. The joint drainage area is 296 square miles. The waters of Birch Creek are diverted into the Birch Creek Canal at a point twelve miles below the Swift Dam. From that point this canal runs easterly to Dupuyer Creek, and empties into the latter. A short distance from where the waters join they are diverted into Dupuyer Creek Canal. The Dupuyer Creek Canal delivers the water to both the "C" Canal and the "C-3". The "C" Canal is for irrigation of lands which are irrigated from direct flow of the streams, and the "C-3" Canal empties into Lake Frances Reservoir. It is intended to use both running and flood water.

**Number of Reservoirs with Area and Capacity of each:**

Two completed reservoirs, and one proposed. No. 1, Birch Creek Canyon Reservoir, area 445 acres, capacity 30,000 acre feet. No. 2, Lake Frances Reservoir, area 5,536 acres, capacity 112,000 acre feet. No. 3, Dry Fork Reservoir, proposed. Area 397 acres, capacity 8,000 acre feet.

**Water Otherwise Appropriated on the Streams:**

No general adjudication has been made on any of the streams, but the Company after very careful investigation finds that there are about 20,000 acre feet



Showing Lower End of Spillway Lip and Upper End of Wasteway Through Solid Rock for the Birch Creek Reservoir, Valler "Carey" Project.

of valid appropriations or outstanding rights, to a greater portion of which the Company's appropriations are prior.

**Canals Leading from Streams to Land or Reservoir:**

Birch Creek Canal, 13.9 miles long, capacity 700 second feet.

Dupuyer Creek Canal, 3.7 miles long, capacity 900 second feet.

"C-3" Canal, 2.2 miles long, capacity 900 second feet.

**Length of main canal from Reservoir completed:** 29.3 miles.

**Length of main canal from Reservoir to be built:** None.

**Length of main laterals completed:** 133.7 miles.

**Length of main laterals to be built:** 9.7 miles.

**Length of distributing laterals completed:** 292 miles.

**Length of distributing laterals to be built:** 5 miles.

**Total length of canals and laterals completed:** 474.8 miles.

**Total length of canals and laterals to be built:** 14.7 miles.

**Character of Construction:**

The canals and structures on the project are built according to the most up-to-date engineering practices. Most of the canals are built for possible larger capacities in the future, and are of more than ample size to take care of all present and future needs.

**Number and Character of Structures:**

Wherever possible all structures on the main canals and laterals are built of reinforced concrete. The principal structures on the project are Swift Dam, a concrete-faced, rock-fill dam in Birch Creek Canyon; 159 feet high, 400 feet long on top, with tunnel outlet, earth and rock-fill dike 40 feet high and 400 feet long on top. This dike is 700 feet north of the Swift Dam. Concrete lined spillway for above reservoir, which is cut through solid rock, and will have a capacity of about 10,000 cubic feet per second. The drainage basin above this dam is approximately 108 square miles in the Rocky Mountains. Lake Frances Dam, an earth dam 40 feet high, and 600 feet long on top, with reinforced concrete core wall and double 53-inch barrel tunnel outlet and gate tower. Lake Frances dike, partially completed, an earth dike 20 feet high, and 6200 feet long on top, with reinforced concrete outlet, culvert and tower, concrete cut-off wall well into impervious material; construction activities to be resumed in 1917.

**Big Flat Coulee Siphon:**

This consists of 1,000 feet of concrete pressure pipe, 7 feet in diameter, 3,800 feet of wood stave pipe, 78 inches in diameter, with intake and outlet structures. The wood stave pipe is under 160 feet head at the lowest point of the coulee, and has a capacity of 375 second feet.

**Birch Creek Diversion Dam:**

Located on Birch Creek about twelve miles below the Swift Dam. This consists of a concrete diversion dam across Birch Creek and massive concrete headgates. It diverts the waters of Birch Creek into Birch Creek Canal. At the present time a new Cyclopean masonry diversion weir and reinforced concrete gate structure and reinforced concrete measuring compartment, containing gate for the purpose of discharging water to outstanding right holders, and an earth dike 1,300 feet long, are under construction. The new weir will be 400 feet long.

We have two reinforced concrete drops on Birch Creek Canal, one a five foot drop with a capacity of 700 second feet, and an 11 foot drop of the same capacity.

**Concrete and Timber Drops on the Birch Creek and Dupuyer Creek Canals:**

About 80 feet of excess grade in the Birch Creek Canal is taken care of by about 35 timber and concrete drops. These drops consist of heavy timber aprons and floors with concrete wing walls. These drops are about 2½ feet high each. In the Dupuyer Creek Canal there are six of these drops, of about the same size.

**Dupuyer Creek Headgates and Diversion Weir:**

A Diversion Wier reaches across Dupuyer Creek and diverts the waters of this creek into the Dupuyer Creek Canal. The whole structure is of concrete.

**Drops:**

In constructing drops on the project, a system has been followed of using reinforced concrete wherever the capacity of the canal was more than 20 cubic feet per second. Where it amounted to less than 20 cubic feet, timber was used.

**Turncuts:**

All turnouts from main canals and main laterals which have a capacity of more than 60 cubic feet per second, have been constructed of reinforced concrete. Where the capacity of the main canal or distributing lateral is less than 60 cubic feet per second, timber turnouts have been constructed.

**Checks:**

A number of checks have been placed in main canals and main laterals. These have been constructed of reinforced concrete.

**Bridges:**

About 400 bridges have been constructed on County and other roads. They have been designed according to County regulations, to carry a fifteen-ton traction engine, or a distributed load of 20,000 pounds.

**Timbers Drops, Checks, Division Boxes and Rating Flumes:**

About 900 checks, drops, division boxes and rating flumes are now in use for the proper distribution of the water. These are all of timber.

**Engineering Difficulties:**

The appearance of seepage over small area in the northeastern part of the project.

Total estimated cost of project: \$4,060,946.83.

Total expenditures to October 31, 1916: \$3,936,431.99.

Price of water right per acre for Carey Act lands: \$40.00.

Price of water right per acre for lands owned by the Company: \$40.00.

Price of water right per acre for other than Company and Carey Act lands: \$40.00.

Terms of payments of water contracts: A charge of \$5.00 per acre is made at the time of purchase, the balance being paid in fourteen equal annual payments with interest at 6 per cent on deferred payments.

Total number of acres within boundaries of the project: 194,015.

Total number of acres susceptible of irrigation for Carey: 64,408.21.

For Company Deeded: 31,488 (includes 12,552 shares of Pondera Stock)

Private: 28,442.43

State: 7,924.00

Total number of acres to be actually irrigated by project: 88,270.

**What Necessities for Drainage System have arisen:**

During 1915 and 1916 some seeped area appeared under the "L-2" Canal in Township 30 North, Range 3 West, and under the "An" Canal in Township 30 North, Range 4 West.

**What Character of Drainage Has Been Adopted, and to What Extent in Actual Construction:**

A survey and investigation was immediately started to ascertain the cause, and strenuous measures were taken to relieve the situation. \* \* \* \* This matter is being worked into shape for a renewal of construction activities in the spring of 1917.

Number of acres of Carey land filed on: 37,467.93.

Number of acres of Carey Land filed on susceptible of irrigation: 29,242.58.

Number of acres of Carey land open to entry: 47,992.26.

Number of acres of Carey land open to entry susceptible of irrigation: \*35,165.63.

Amount of water per acre required to be furnished by Carey Board: 18 inches.

Amount of water per acre actually required by land: 12.2 inches were given for the season of 1914, but since then no measurements of any weight have been made.

Methods of measuring water to farm units: Arrangements are now under consideration to carefully investigate each and every farm unit on the project, with a view of determining the exact type of measuring device needed on each, and as each unit is passed upon, the device needed will be installed and operated. The campaign of investigation and installation will be started in the spring of 1917.

Method of record of water delivery: Written application for water is made by user on blanks furnished by the Company. These blanks are left in tin boxes on user's headgate and are taken up by the Ditch Rider and sent to the Water Master's office together with Rider's report of delivery. The same method is pursued in shutting off water, the Rider using in addition a special report showing any changes or interruptions in flow of water from original report. The combination of these reports dates time and amount of water used. All records are kept by name and description of the land. Certified summary of deliveries are made monthly by Riders.

Amount charged per acre for maintenance as per contract with state: 50 cents.

Actual cost of maintenance per acre:

1912	1913	1914	1915	1916
.48	.95	.92	.92	.90

\*NOTE: These figures should be reduced by amount of lands under the R and T Systems and certain scattered isolated tracts amounting to approximately 7,626.21 acres.

**TETON PROJECT.**

This project lies near Brady and is situated between the Valier Carey Project and the Sun River U. S. R. S. project and has practically the same soil and topographical condition. It comprises an area of 34,206.60 acres and the approval of the segregation is still pending.

Considerable money has been expended by the company on this system during the past year, and the good faith thus shown gives

us confidence that as soon as the segregation is approved by the General Land Office, this project will be prosecuted to a successful completion without any unnecessary delay.

Careful and continuous stream measurements are being maintained by the State Engineer's office for the water supply of this project.

#### ITEMIZED DESCRIPTIVE STATEMENT OF THE COMPANY.

Name of Project: The Teton Project.

Name of Company: Teton Cooperative Reservoir Company.

Postoffice Address: Helena, Montana.

County in which Lands are Situated: Teton County.

Description of Location:

Altitude: 4,100 feet.

Topography: Gently rolling prairie land.

Soil: Sandy loam.

Description of Water Supply:

Stream or Streams from which water supply is obtained: Teton River, Blackleaf and Muddy Creeks.

Whether running water, flood water, or both: Both.

Number of Reservoirs with area and capacity of each:

One reservoir of 80,000 acre-feet.

One distributing reservoir, 5,000 acre-feet.

Canal leading from stream to land or reservoir:

Length: 4 miles to reservoir of 80,000 acre-feet.

Capacity: When completed, 800 second-feet.

Length of main canal from reservoir completed: None.

Length of main canal from reservoir to be built: About 35 miles.

Total length of canals and laterals completed: 4 miles.

Total length of canals and laterals to be completed: Unknown.

General Description of Project:

Character of Construction: Canal generally through earth and hard pan.

Number and Character of Structures: One metal flume, two syphons of 450 second-foot capacity.

Engineering Difficulties: Not formidable.

Total Expenditures to October 31, 1916: About \$400,000.

Price of Water Right per acre for Carey Act lands: Probably not less than \$40.00.

Price of water right per acre for lands owned by the Company: Company has no lands other than Carey Lands.

Terms of payments on water contract: Not determined.

Total number of acres within boundaries of project: About 34,000.

Total number of acres susceptible of irrigation for Carey: Net amount after deducting roads, etc., about 30,000.

Total number of acres to be actually irrigated by project: About 30,000.

Number of acres of Carey land open to entry: None as yet.

Amount of water per acre required to be furnished by Carey Board: Not determined.

Amount of water per acre actually required by land: About  $1\frac{1}{2}$  acre-feet.

Method of measuring water to farm units: Not determined.

TETON COOPERATIVE RESERVOIR CO.,

By A. K. PRESCOTT, President.

#### FLATWILLOW PROJECT.

This project is located southeast of Lewistown in Fergus County, and is comprised of 7,768.80 acres of land under the Carey Act.

The building of the irrigation system for this project and the colonization of the land within the same is to be done by the Fergus County Land & Irrigation Company.

The said company has done some work on the project and it is their intention to complete the irrigation system by the latter part of 1918.

The State Engineer's office is maintaining continuous measurements on the stream supplying the water for this project.

There is no material change in the Company's statements from two years ago.

### LITTLE MISSOURI PROJECT.

The Little Missouri Land & Irrigation Company has contracted with the State of Montana for the reclamation and settlement of 20,607.98 acres of Carey Act land within this project, and under the terms and provisions of said contract the irrigation system is to be completed by the latter part of the year 1918.

The said project is located at the southeast corner of the State, in Fallon County.

The State Engineer's office is maintaining continuous records of the water supply in the Little Missouri River.

The Company's statement to October 31st, 1916, follows:

Name of Project: Little Missouri Irrigation Project.  
 Name of Company: Little Missouri Land & Irrigation Company.  
 Post Office Address: 520 Daly Bank Building, Butte, Montana, and Albion, Fallon County, Montana.  
 County in which lands are situated: Fallon County, Montana.  
 Description of Location:  
 Altitude: 3,000 feet.  
 Topography: Comparatively level with a gentle slope of about 12 feet to the mile toward the Little Missouri River.  
 Soil: Heavy clay and loam.  
 Description of Water Supply:  
 Stream or streams from which water supply is obtained: Will be obtained from the Little Missouri River and Cotton Wood Creek.  
 Whether running water, flood water, or both: The flood as well as running waters will be impounded in a reservoir being constructed upon Cotton Wood Creek.  
 Number of Reservoirs with area and capacity of each:  
 There will be one reservoir known as Cotton Wood Creek, covering about 1500 acres and impounding about 20,000 acre feet.  
 Water otherwise appropriated on the stream:  
 Some few small appropriations prior to those of this Company on the Little Missouri River, amounting somewhere in the neighborhood of 625 inches.  
 Canal leading from stream to land or reservoir:  
 Length: About five miles.  
 Capacity: A canal diverting the waters of the Little Missouri River to the reservoir will when completed be about five miles in length; seventeen feet in width on bottom; thirty-seven feet at top; will carry five hundred second-feet of water.  
 Length of main canal from reservoir completed: About ten miles except 112 feet of fluming.  
 Length of main canal from reservoir to be built: About fifteen miles more.  
 Length of main laterals completed: None.  
 Length of main laterals to be built: Unable to give accurate details as to number of miles when completed.  
 Length of distributing laterals completed: None.  
 Length of distributing laterals to be built: All to be built.  
 Total length of canals and laterals completed: About ten miles.  
 Total length of canals and laterals to be completed: Unable to give details as to number of miles when completed.  
 Number and Character of Structures: Main reservoir dam; earth construction; face to be riprapped with rock; reinforced concrete conduit outlet 4x5 feet in the clear; now completed; ditches, earth work with concrete and iron flumes. Main dam across the Little Missouri River to be solid reinforced concrete structure.  
 Engineering difficulties: None.  
 Total estimated cost of project: Approximately \$250,000.  
 Total expenditures to October 31st, 1916: About \$75,000.  
 Price of water right per acre for Carey Act Lands: \$40.00 per acre.  
 Price of water right per acre for lands owned by the Company: \$40.00 per acre.  
 Price of water right per acre for other than Company: \$40.00.  
 Terms of payments on water contract: Ten equal annual installments with interest on deferred payments at 6% per annum.  
 Total number of acres within boundaries of Project: About 26,000 acres.  
 Total number of acres susceptible of irrigation for  
 Carey: 20,607 acres.  
 Company Deeded: None.

Private: About 6,000 acres.

Total number of acres to be actually irrigated by Project: About 26,000 acres.

Number of acres of Carey Land filed on: None.

Number of acres of Carey Land open to entry: 20,607.

Number of acres of Carey Land open to entry susceptible to irrigation: Practically all.

Amount of Water per acre required to be furnished by Carey Board: 1½ acre-feet per acre.

Amount of Water per acre actually required by land: Amount actually required, not yet demonstrated on Project; but on similar lands where small tracts have been irrigated, one acre foot has been found sufficient.

Amount charged per acre for maintenance as per contract with Carey Board: 50c per acre per annum.

Actual cost of maintenance per acre: Not yet determined.

Respectfully submitted,

LITTLE MISSOURI LAND & IRRIGATION CO.,

A. T. MORGAN, Secretary.

## SUMMARY OF PROJECTS.

	Acres
Billings Project, approved list No. 1.....	10,472.88
Big Timber Project, approved list No. 2.....	7,829.84
Big Timber Project, approved list No. 3.....	400.00
Billings Project, approved list No. 7.....	3,361.75
Valier Project, approved list No. 8.....	60,421.41
Big Timber Project, approved list No. 9.....	1,360.00
Teton Project, pending list No. 10.....	34,206.60
Big Timber Project, approved list No. 11.....	1,709.32
Valier Project, approved list No. 12.....	3,596.58
Valier Project, approved list No. 14.....	21,522.15
Flatwillow Project, approved list No. 21.....	7,768.80
Little Missouri Project, approved list No. 22.....	20,607.98
<b>Total</b> .....	<b>173,257.31</b>

### Relinquishments.

List 2 of Big Timber Project, March 1, 1916.....	34.94
List 3 of Big Timber Project, April 6, 1915.....	920.08
List 8 of Valier Project, March 20, 1916.....	40.00
List 10 of Teton Project, Sept. and Nov., 1915; Jan. 1916.....	21,147.23
List 23 of Beaverhead Project, March 15, 1915.....	8,031.20

**Total** ..... 30,173.45

Amount segregated according to Sixth Biennial Report..... 203,430.76

Amount relinquished during the last two years..... 30,173.45

**Total amount segregated November 30, 1916.**..... 173,257.31

### Approved Carey Land Sales.

Billings Project .....	10,192.88
Big Timber Project .....	5,014.94
Valier Project .....	35,150.91

**Total** ..... 50,358.73

**United States Patents Issued to State of Montana.**

	Acres
On Billings Project .....	13,223.54
On Big Timber Project .....	7,356.12
Total .....	20,579.66

**Patents Issued to Settlers by the State of Montana.**

On Billings Project .....	7,795.67
On Big Timber Project .....	3,299.32
Total .....	11,094.99



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NOTE—(misc.) refers to miscellaneous measurements made at points other than regular gaging stations.











